MATHS

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

BINOMIAL THEOREM

Solved Problems I Prove That

1. Prove that : Write the expansion or $(2a+3b)^6$.

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2. Prove that : Find the 5^{th} term in the expansion of $(3x-4y)^7$.

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3. Prove that : Find the 4^{th} term from the end in the expansion $(2a+5b)^8$

.

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4. Prove that : Find the middle term of the following expansions

$(3a-5b)^6$

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5. Prove that : Find the middle term of the following expansions

$(2x+3y)^7$

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6. Prove that : If n is a positive integer then prove that

i) $C_0+C_1+C_2+\ldots\ldots+C_n=2^n$

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7. Prove that

$C_0 + 3.\, C_1 + 5.\, C_2 + \ldots. + (2n+1).\, C_n = (2n+2).2^{n-1}.$

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8. Find the numerically greatest terms in the expansion of $(1-5x)^{12}$ when $x = \frac{2}{3}$

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9. Prove that : Compute numerically ireatist term (s) in the expansionly of $(3x-5y)^n$ when $x = \frac{3}{4}, y = \frac{2}{7}$ and $n = 17$

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10. Prove that : Find the largest binomial coefficients (s) in the expansion of

$(1+x)^{19}$

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11. Prove that : Find the largest binomial coefficients (s) in the expansion of

$(1+x)^{24}$

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12. If ${}^{22}C_r$ is the largest binomial coefficient in the expansion of $(1+x)^{22}$, find the value of ${}^{13}C_r$.

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13. Prove that : Find the 7^{th} term in the expansion of $\left(\frac{4}{x^3}+\frac{x^2}{2}\right)^{14}$.

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14. Prove that : Find the 3^{rd} term from the end in the expansion of $\left(x^{-2/3}-\frac{3}{x^2}\right)^8$.

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15. Prove that : Find the coefficient of x^9 and x^{10} in the expansion of $\left(2x^2-\frac{1}{x}\right)^{20}$.

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16. Prove that : Find the term independent of x (that is the constant term) in the expansion of $\left(\frac{\sqrt{x}}{3}+\frac{3}{2x^2}\right)^{10}$

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17. Prove that : If the coefficients of x^{10} in the expansion of $\left(ax^2+\frac{1}{\mathrm{bx}}\right)^{11}$ is equal to the coeffi cient of x^{-10} in the expansion of $\left(ax-\frac{1}{\mathrm{bx}^2}\right)^{11}$, find the relation between a and b where a and b are real numbers.

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18. Prove that : If the k^{th} term is the middle term in the expansion of $\left(x^2-\frac{1}{2x}\right)^{20}$, find T_k and T_{k+3}.

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19. Prove that : If the coefficients of $(2r+4)^{\mathrm{th}}$ and $(r-2)^{\mathrm{nd}}$ terms in the expansion of $(1+x)^{18}$ are equal, find r.

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20. Prove that : Prove that

$2.\ C_0 + 7.\ C_1 + 12.\ C_2 + \ldots\ldots\ldots + (5n+2)C_n = (5n+4)2^{n-1}.$

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21. Prove that : Prove that

$C_0 + 3.\ C_1 + 3_2.\ C_2 + \ldots\ldots + 3^n.\ C_n = 4^n$

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22. Prove that : Prove that

$$\frac{C_1}{C_0} + 2.\ \frac{C_2}{C_1} + 3.\ \frac{C_3}{C_2} + \ldots. + n.\ \frac{C_n}{C_{n-1}} = \frac{n(n+1)}{2}$$

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23. Prove that : For n = 0, 1, 2, 3, ..., n, prove that

$C_0.\, C_r + C_1.\, C_{r+1} + C_2.\, C_{r+2} + \ldots. + C_{n-r}.\, C_n$

$= {}^{2n}C_{(n+r)}$ and hence deduce that

Prove that : $C_0^2 + C_1^2 + C_2^2 + \ldots. + C_n^2 = {}^{2n}C_n$

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24. Prove that : For n = 0, 1, 2, 3, ..., n, prove that

$C_0.\, C_r + C_1.\, C_{r+1} + C_2.\, C_{r+2} + \ldots. + C_{n-r}.\, C_n$

$= {}^{2n}C_{(n+r)}$ and hence deduce that

$C_0.\, C_1 + C_1.\, C_2 + C_2.\, C_3 + \ldots\ldots. + C_{n-1}.\, C_n = {}^{2n}C_{n+1}$

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25. Prove that

$3.\, C_0^2 + 7.\, C_1^2 + 11.\, C_2^2 + \ldots.. + (4n+3).\, C_n^2 = (2n+3).\, {}^{2n}C_n.$

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26. Prove that : Find the numerically greatest term (s) in the expansion of

i) $(2+3x)^{10}$ when $x=\frac{11}{8}$

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27. Prove that $6^{2n}-35n-1$ is divisible by 1225 for all natural numbers of n.

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28. Prove that : Suppose that n is a natural number and I, F are respectively the integral part and fractional part of $\left(7+4\sqrt{3}\right)^n$. Then show that

(i) I is an odd integer

(ii) $(I+F)(I-F)=1$

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29. Prove that : Find the coefficient of x^6 in $\left(3+2x+x^2\right)^6$.

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30. Prove that : If n is a positive integer, then prove that

$$C_0+\frac{C_1}{2}+\frac{C_2}{3}+\ldots.+\frac{C_n}{n+1}=\frac{2^{n+1}-1}{n+1}.$$

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31. Prove that : If n is a positive integer and x is any nonzero real number, then prove that

$$C_0+C_1\frac{x}{2}+C_2.\frac{x^2}{3}+C_3.\frac{x^3}{4}+\ldots.+C_n.\frac{x^n}{n+1}=\frac{(1+x)^{n+1}-1}{(n+1)x}$$

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32. Prove that

$$C_0^2-C_1^2+C_2^2-C_3^2+\ldots.+(-1)^n.C_n^2=\begin{cases}(-1)^{n/2}{}^nC_{n/2}, & \text{if n is ev}\\ 0\quad\quad\quad\quad, & \text{if n is od}\end{cases}$$

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33. Prove that : Find the set E of the value of x for which the binomial expansions for the following are valid

$(3-4x)^{3/4}$

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34. Prove that : Find the set E of the value of x for which the binomial expansions for the following are valid

$(2+5x)^{-1/2}$

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35. Prove that : Find the set E of the value of x for which the binomial expansions for the following are valid

$(7-4x)^{-5}$

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36. Prove that : Find the set E of the value of x for which the binomial expansions for the following are valid

$(4+9x)^{-2/3}$

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37. Prove that : Find the set E of the value of x for which the binomial expansions for the following are valid

$(a+bx)^{r}$

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38. Prove that : Find the

9^{th} term of $\left(2+\frac{x}{3}\right)^{-5}$

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39. Prove that : Find the

10^{th} term of $\left(1-\frac{3x}{4}\right)^{4/5}$

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40. Prove that : Find the

8^{th} term of $\left(1-\frac{5x}{2}\right)^{-3/5}$

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41. Prove that : Find the

6^{th} term of $\left(3+\frac{2x}{3}\right)^{3/2}$

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42. Prove that : Write the first 3 terms in the expansion of

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

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43. Prove that : Write the first 3 terms in the expansion of

$(3+4x)^{-2/3}$

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44. Prove that : Write the first 3 terms in the expansion of

$(4-5x)^{-1/2}$

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45. Prove that : Write the general term in the expansion of

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

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46. Prove that : Write the general term in the expansion of

$$\left(2+\frac{3x}{4}\right)^{4/5}$$

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47. Prove that : Write the general term in the expansion of

$$(1-4x)^{-3}$$

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48. Prove that : Write the general term in the expansion of

$$(2-3x)^{-1/3}$$

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49. Prove that : Find the coefficient of x^{12} in $\frac{1+3x}{(1-4x)^4}$.

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50. Prove that : Find coeff. of x^6 in the expansion of $(1-3x)^{-2/5}$.

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51. Prove that : Find the sum of the infinite series

$$1+\frac{2}{3}.\frac{1}{2}+\frac{2.5}{3.6}\left(\frac{1}{2}\right)^2+\frac{2.5.8}{3.6.9}\left(\frac{1}{2}\right)^3+.....\infty$$

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52. Prove that : Find the sum of the series

$$\frac{3.5}{5.10}+\frac{3.5.7}{5.10.15}+\frac{3.5.7.9}{5.10.15.20}+....\infty$$

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53. If $x=\frac{1}{5}+\frac{1.3}{5.10}+\frac{1.3.5}{5.10.15}+....\infty$ then find $3x^2+6x$.

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54. Prove that : If $|x|$ is so small that x^3 and higher powers or x can be neglected, find approximate value of $\frac{(4-7x)^{1/2}}{(3+5x)^3}$.

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55. Prove that : Find an approximate value of $\sqrt[6]{63}$ correct to 4 decimal places.

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56. Prove that : If $|x|$ is so small that x^2 and higher powers of x may be neglected, then find an approximate value of $\frac{\sqrt{1+x}(1+4x)^{\frac{1}{3}}}{(1+x^2)\left((1-3x)^2\right)^{\frac{1}{3}}}$

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57. Prove that : If $|x|$ is so small that x^4 and higher powers of x may be neglected, then find the approximate value of

$\sqrt[4]{x^2. + 81} - \sqrt[4]{x^2 + 16.}$

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58. Prove that : Suppose that x and y are positive and x is very small when compared to y. Then find an approximate value of

$\left(\frac{y}{y+x}\right)^{3/4} - \left(\frac{y}{y+x}\right)^{4/5}$

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59. Prove that : Expand $5\sqrt{5}$ in increasing powers of $\frac{4}{5}$.

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Dam Sure Vsaq

1. Find the number of terms in the expansion of $(2x + 3y + z)^7$

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2. Prove the $C_0 + 2.\ C_1 + 4.\ C_2 + 8.\ C_3 + \ldots + 2^n.\ C_n = 3^n$

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3. If ${}^{22}C_r$ is the largest binomial coefficient in the expansion of $(1 + x)^{22}$, find the value of ${}^{13}C_r$.

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Dam Sure Saq

1. Write down and simplify 6^{th} term in $\left(\frac{2x}{3} + \frac{3y}{2}\right)^9$

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2. If the coefficients of $(2r+4)^{\text{th}}$ term and $(3r+4)^{\text{th}}$ term in the expansion of $(1+x)^{21}$ are equal, find r.

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3. Find the sum of the infinite series

$$1+\frac{1}{3}+\frac{1.3}{3.6}+\frac{1.3.5}{3.6.9}+\ldots.$$

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4. Prove that : Find the set E of the value of x for which the binomial expansions for the following are valid

$(4+9x)^{-2/3}$

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Dam Sure Laq

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

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2. If the coefficients of $r^{\text{th}}, (r+1)^{\text{th}}$ and $(r+2)^{\text{nd}}$ terms in the expansion of $(1+x)^n$ are in A.P. then show that $n^2-(4r+1)n+4r^2-2=0$.

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3. If n is a positive integer, prove that

$$\sum_{r=1}^{n} r^3\left(\frac{{}^nC_r}{{}^nC_{r-1}}\right)^2=\frac{(n)(n+1)^2(n+2)}{12}$$

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4. Find the set of values of x for which the binomial expansions of the following are valid.

$(2+3x)^{-2/3}$

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5. Find the set of values of x for which the binomial expansions of the following are valid.

$(5+x)^{3/2}$

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6. Find the set of values of x for which the binomial expansions of the following are valid.

$(7+3x)^{-5}$

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7. Find the set of values of x for which the binomial expansions of the following are valid.

$$\left(4-\frac{x}{3}\right)^{-1/2}$$

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8. Find the sum of the infinite series

$$\frac{3}{4}+\frac{3.5}{4.8}+\frac{3.5.7}{4.8.12}+\ldots.$$

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9. If $x=\frac{1.3}{3.6}+\frac{1.3.5}{3.6.9}+\frac{1.3.5.7}{3.6.9.12}+\ldots.$ then prove that $9x^2+24x=11.$

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10. If $x=\frac{5}{(2!).3}+\frac{5.7}{(3!).3^2}+\frac{5.7.9}{(4!).3^3}+\ldots.$ then find the value of $x^2+4x.$

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11. Find the sum of the infinite series

$$\frac{7}{5}\left(1+\frac{1}{10^2}+\frac{1.3}{1.2}.\frac{1}{10^4}+\frac{1.3.5}{1.2.3}.\frac{1}{10^6}+....\right)$$

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12. Prove that : For n = 0, 1, 2, 3, ..., n, prove that

$$C_0.C_r+C_1.C_{r+1}+C_2.C_{r+2}+....+C_{n-r}.C_n$$

$$={}^{2n}C_{(n+r)}$$ and hence deduce that

Prove that : $C_0^2+C_1^2+C_2^2+....+C_n^2={}^{2n}C_n$

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13. Prove that : For n = 0, 1, 2, 3, ..., n, prove that

$$C_0.C_r+C_1.C_{r+1}+C_2.C_{r+2}+....+C_{n-r}.C_n$$

$= {}^{2n}C_{(n+r)}$ and hence deduce that

$C_0 . C_1 + C_1 . C_2 + C_2 . C_3 + \ldots\ldots\ldots + C_{n-1} . C_n = {}^{2n}C_{n+1}$

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14. If $x = \frac{1}{5} + \frac{1.3}{5.10} + \frac{1.3.5}{5.10.15} + \ldots. \infty$ then find $3x^2 + 6x$.

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Tetual Exercises Exercise 6 A I

1. Expand the following using binomial theorem.

$(4x + 5y)^7$

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2. Expand the following using binomial theorem.

$\left(\frac{2}{3}x + \frac{7}{4}y\right)^5$

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3. Expand the following using binomial theorem.

$$\left(\frac{2p}{5} - \frac{3q}{7}\right)^6$$

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4. Expand the following using binomial theorem.

$$\left(3 + x - x^2\right)^4$$

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5. Write down and simplify 6^{th} term in $\left(\frac{2x}{3} + \frac{3y}{2}\right)^9$

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6. Write down and simplify

7^{th} term in $(3x - 4y)^{10}$

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7. Write down and simplify

10^{th} term in $\left(\frac{3p}{4} - 5q\right)^{14}$

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8. Write down and simplify

r^{th} term in $\left(\frac{3a}{5} + \frac{5b}{7}\right)^{8} \quad (1 \leq r \leq 9)$

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9. Find the number of terms in the expansion of

$\left(\frac{3a}{4} + \frac{b}{2}\right)^{9}$

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10. Find the number of terms in the expansion of

$(3p + 4q)^{14}$

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11. Find the number of terms in the expansion of $(2x + 3y + z)^7$

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12. Find the number of teerms with non-zero coefficients in $(4x - 7y)^{49} + (4x + 7y)^{49}$.

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13. Find the sum of last 20 coefficients in the expansions of $(1 + x)^{39}$.

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14. If A and B are coefficients of x^n in the expansion of $(1+x)^{2n}$ and $(1+x)^{2n-1}$ respectively, then find the value of $\frac{A}{B}$.

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Tetual Exercises Exercise 6 A Ii

1. Find the coefficient of

x^{-6} in $\left(3x - \frac{4}{x}\right)^{10}$

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2. Find the coefficient of

x^{11} in $\left(2x^2 + \frac{3}{x^3}\right)^{13}$

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3. Find the coefficient of

$$x^2 \text{ in } \left(7x^3 - \frac{2}{x^2}\right)^9$$

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4. Find the coefficient of

$$x^{-7} \text{ in } \left(\frac{2x^2}{3} - \frac{5}{4x^5}\right)^7$$

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5. Find the term independent of x in the expansion of

$$\left(\frac{\sqrt{x}}{3} - \frac{4}{x^2}\right)^{10}$$

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6. Find the term independent of x in the expansion of

$$\left(\frac{3}{\sqrt[3]{x}}+5\sqrt{x}\right)^{25}$$

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7. Find the term independent of x in the expansion of

$$\left(4x^3+\frac{7}{x^2}\right)^{14}$$

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8. Find the term independent of x in the expansion of

$$\left(\frac{2x^2}{5}+\frac{15}{4x}\right)^{9}$$

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9. Find the middle term (s) in the expansion of

$$\left(\frac{3x}{7} - 2y\right)^{10}$$

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10. Find the middle term (s) in the expansion of

$$\left(4a + \frac{3}{2}b\right)^{11}$$

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11. Find the middle term (s) in the expansion of

$$\left(4x^2 + 5x^3\right)^{17}$$

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12. Find the middle term (s) in the expansion of

$$\left(\frac{3}{a^3} + 5a^4\right)^{20}$$

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13. Find the numerically greatest term (s) in the expansion of

$(4+3x)^{15}$ when $x=\frac{7}{2}$

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14. Find the numerically greatest term (s) in the expansion of

$(3x+5y)^{12}$ when $x=\frac{1}{2}, y=\frac{4}{3}$

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15. Find the numerically greatest term (s) in the expansion of

$(4a-6b)^{13}$ when $a=3, b=5$

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16. Find the numerically greatest term (s) in the expansion of

$(3+7x)^n$ when $x=\frac{4}{5}, n=15$

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17. Prove that following

i) $2.C_0+5.C_1+8.C_2+\ldots..+(3n+2)C_n=(3n+4).2^{n-1}$

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18. Prove that following

$C_0-4.C_1+7.C_2-10.C_3+\ldots..=0,$ if n is an even positive integer.

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19. Prove that following

$$\frac{C_1}{2}+\frac{C_3}{4}+\frac{C_5}{6}+\frac{C_7}{8}+\ldots\ldots=\frac{2^n-1}{n+1}$$

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20. Prove that following

$$C_0+\frac{3}{2}.C_1+\frac{9}{3}.C_2+\frac{27}{4}.C_3+\ldots\ldots+\frac{3^n}{n+1}.C_n=\frac{4^{n+1}-1}{3(n+1)}.$$

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21. Prove that following

$$C_0+2.C_1+4.C_2+8.C_3+\ldots+2^n.C_n=3^n$$

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22. Find the sum of the following

$$\frac{{}^{15}C_1}{{}^{15}C_0}+2\frac{{}^{15}C_2}{{}^{15}C_1}+3\frac{{}^{15}C_3}{{}^{15}C_2}+\ldots\ldots+15\frac{{}^{15}C_{15}}{{}^{15}C_{14}}$$

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23. Find the sum of the following

$C_0 . C_3 + C_1 . C_4 + C_2 . C_5 + \ldots + C_{n-3} . C_n .$

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24. Find the sum of the following

$2^2 . C_0 + 3^2 . C_1 + 4^2 . C_2 + \ldots . + (n+2)^2 C_n$

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25. Find the sum of the following

$3C_0 + 6C_1 + 12C_2 + \ldots . + 3.2^n . C_n$

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26. Using binomial theorem, prove that $50^n - 49n - 1$ is divisible by 49^2 for all positive integers n.

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27. Using binomial theorem, prove that $5^{4n} + 52n - 1$ is divisible by 676 for all positive integers n.

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28. If $\left(1 + x + x^2\right)^n = a_0 + a_1 x + a_2 x^2 + \ldots. + a_{2n} x^{2n}$, then prove that

$a_0 + a_1 + a_2 \ldots. + a_{2n} = 3^n$

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29. If $\left(1+x+x^2\right)^n = a_0 + a_1 x + a_2 x^2 + \ldots. + a_{2n} x^{2n}$, then prove that

$$a_0 + a_2 + a_4 + \ldots\ldots + a_{2n} = \frac{3^n + 1}{2}$$

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30. If $\left(1+x+x^2\right)^n = a_0 + a_1 x + a_2 x^2 + \ldots. + a_{2n} x^{2n}$, then prove that

$$a_1 + a_3 + a_5 + \ldots. + a_{2n-1} = \frac{3^n - 1}{2}$$

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31. If $\left(1+x+x^2\right)^n = a_0 + a_1 x + a_2 x^2 + \ldots. + a_{2n} x^{2n}$, then prove that

$$a_0 + a_3 + a_6 + a_9 + \ldots\ldots = 3^{n-1}$$

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32. If $\left(1+x+x^2+x^3\right)^7 = b_0 + b_1 x + b^2 x^2 + \ldots . b_{21} x^{21}$, then find the value of

$b_0 + b_2 + b_4 + \ldots \ldots + b_{20}$

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33. If $\left(1+x+x^2+x^3\right)^7 = b_0 + b_1 x + b^2 x^2 + \ldots . b_{21} x^{21}$, then find the value of

$b_1 + b_3 + b_5 + \ldots \ldots + b_{21}$

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34. If the coefficient of x^{11} and x^{12} in the binomial expansion of $\left(2+\frac{8x}{3}\right)^n$ are equal, find n.

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35. Find the remainder when 2^{2013} in divided by 17.

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Tetual Exercises Exercise 6 A Iii

1. If the coefficients of x^9, x^{10}, x^{11} in expansion of $(1+x)^n$ are in A.P., the prove that $n^2 - 41n + 398 = 0$.

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2. If 36, 84, 126 are three successive binomial coefficients in the expansion of $(1+x)^n$, find n.

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3. Find the sum of the coefficients of x^{32} and x^{-18} in the expansion of $\left(2x^3 - \frac{3}{x^2}\right)^{14}$.

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4. If P and Q are the sum of odd terms and the sum of even terms respectively in the expansion of $(x+a)^n$ then prove that

$P^2 - Q^2 = \left(x^2 - a^2\right)^n$

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5. If P and Q are the sum of odd terms and the sum of even terms respectively in the expansion of $(x+a)^n$ then prove that

$4PQ = (x+a)^{2n} - (x-a)^{2n}$

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6. If the coefficients of 4 consecutive terms in the expansion of $(1+x)^n$ are a_1, a_2, a_3, a_4 respectively, then show that

$$\frac{a_1}{a_1 + a_2} + \frac{a_3}{a_3 + a_4} = \frac{2a_2}{a_2 + a_3}$$

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7. Prove that

$$\left({}^{2n}C_0\right)^2 - \left({}^{2n}C_1\right)^2 + \left({}^{2n}C_2\right) - \left({}^{2n}C_3\right)^2 + \ldots\ldots + \left({}^{2n}C_{2n}\right)^2 = (-1)^n \left({}^{2n}C_n\right)$$

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8. Prove that

$$(C_0 + C_1)(C_1 + C_2)(C_2 + C_3)\ldots\ldots (C_{n-1} + C_n) = \frac{(n+1)^n}{n!} . C_0 . C_1 . C_2 \ldots$$

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9. Find the term independent of x in

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

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10. Show that the middle term in the expansion of $(1 + x)^{2n}$ is $\frac{1.3.5. . . (2n-1)}{n!}(2x)^n .$

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

$a_0+a_1+a_2+\ldots\ldots+a_{20}=2^{10}$

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

$a_0-a_1++a_2-a_3+\ldots\ldots+a_{20}=4^{10}$

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13. If $\left(3\sqrt{3}+5\right)^{2n+1}=x$ and $f=x-[x]$ where ([x] is the integral part of x), find the value of x.f.

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14. If R, n are positive integers, n is odd,

$0 < F < 1$ and if $\left(5\sqrt{5}+11\right)^n = R + F$, then prove that

R is an even integer and

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15. If R, n are positive integers, n is odd,

$0 < F < 1$ and if $\left(5\sqrt{5}+11\right)^n = R + F$, then prove that

$(R+F).F = 4^n$

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16. Prove that : Suppose that n is a natural number and I, F are respectively the integral part and fractional part of $\left(7+4\sqrt{3}\right)^n$. Then show that

(i) I is an odd integer

(ii) $(I+F)(I-F) = 1$

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17. Prove that : Suppose that n is a natural number and I, F are respectively the integral part and fractional part of $\left(7+4\sqrt{3}\right)^n$. Then show that

(i) I is an odd integer

(ii) $(I+F)(I-F)=1$

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18. Find the number of irrational terms in the expansion of $\left(5^{1/6}+2^{1/8}\right)^{100}$.

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Tetual Exercises Exercise 6 B I

1. Find the

6^{th} term of $\left(1+\frac{x}{2}\right)^{-5}$

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2. Find the

7^{th} term of $\left(1-\frac{x^2}{3}\right)^{-4}$

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3. Find the

10^{th} term of $(3-4x)^{-2/3}$.

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4. Find the

5^{th} term of $\left(7+\frac{8y}{3}\right)^{7/4}$.

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5. Write down the first 3 terms in the expansion of

$(3+5x)^{-7/3}$

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6. Write down the first 3 terms in the expansion of

$(1+4x)^{-4}$

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7. Write down the first 3 terms in the expansion of

$(8-5x)^{2/3}$

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8. Write down the first 3 terms in the expansion of

$(2-7x)^{-3/4}$

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9. Find the general term $(r+1)^{\text{th}}$ term in the expansion of

$(4+5x)^{-3/2}$

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10. Find the general term $(r+1)^{\text{th}}$ term in the expansion of

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

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11. Find the general term $(r+1)^{\text{th}}$ term in the expansion of

$\left(1+\frac{4x}{5}\right)^{5/2}$

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12. Find the general term $(r+1)^{\text{th}}$ term in the expansion of

$$\left(3-\frac{5x}{4}\right)^{-1/2}$$

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Tetual Exercises Exercise 6 B Ii

1. Find the coefficient of x^{10} in the expansion of $\frac{1+2x}{(1-2x)^2}$.

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2. Find the coefficient of x^4 in the expansion of $(1-4x)^{-3/5}$.

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3. Find the coefficient of x^5 in $\frac{(1-3x)^2}{(3-x)^{3/2}}$.

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

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5. Find the coefficient of x^7 in $\frac{(2+3x)^3}{(1-3x)^4}$.

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

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Tetual Exercises Exercise 6 B Iii

1. Find the sum of the infinite series

$$1+\frac{1}{3}+\frac{1.3}{3.6}+\frac{1.3.5}{3.6.9}+\ldots\ldots$$

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2. Find the sum of the infinite series

$$1-\frac{4}{5}+\frac{4.7}{5.10}-\frac{4.7.10}{5.10.15}+\ldots\ldots\ldots$$

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3. Find the sum of the infinite series

$$\frac{3}{4}+\frac{3.5}{4.8}+\frac{3.5.7}{4.8.12}+\ldots.$$

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4. Find the sum of the infinite series

$$\frac{3}{4.8} - \frac{3.5}{4.8.12} + \frac{3.5.7}{4.8.12.16} - \ldots\ldots$$

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5. If $t = \frac{4}{5} + \frac{4.6}{5.10} + \frac{4.6.8}{5.10.15} + \ldots\ldots\ldots\infty$ then prove that $9t = 16$.

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6. If $x = \frac{1.3}{3.6} + \frac{1.3.5}{3.6.9} + \frac{1.3.5.7}{3.6.9.12} + \ldots.$ then prove that $9x^2 + 24x = 11$.

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7. If $x = \frac{5}{(2!).3} + \frac{5.7}{(3!).3^2} + \frac{5.7.9}{(4!).3^3} + \ldots.$

then find the value of $x^2 + 4x$.

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8. Find the sum of the infinite series

$$\frac{7}{5}\left(1+\frac{1}{10^2}+\frac{1.3}{1.2}.\frac{1}{10^4}+\frac{1.3.5}{1.2.3}.\frac{1}{10^6}+....\right)$$

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9. Show that

$$1+\frac{x}{2}+\frac{x(x-1)}{2.4}+\frac{x(x-1)(x-2)}{2.4.6}+....$$
$$=1+\frac{x}{3}+\frac{x(x+1)}{3.6}+\frac{x(x+1)(x+2)}{3.6.9}+....$$

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Tetual Exercises Exercise 6 C I

1. Find an approximate value of the following corrected to 4 decimal places.

$\sqrt[5]{242}$

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2. Find an approximate value of the following corrected to 4 decimal places.

$\sqrt[7]{127}$

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3. Find an approximate value of the following corrected to 4 decimal places.

$\sqrt[5]{32.16}$

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4. Find an approximate value of the following corrected to 4 decimal places.

$\sqrt[7]{199}$

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5. Find an approximate value of the following corrected to 4 decimal places.

$\sqrt[3]{1002} - \sqrt[3]{998}$

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6. Find an approximate value of the following corrected to 4 decimal places.

$(1.02)^{3/2} - (0.98)^{3/2}$

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7. If $|x|$ is so small that x^2 and higher powers of x may be neglected then find the approx-imate values of the following

$$\frac{(4+3x)^{1/2}}{(3-2x)^2}$$

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8. If $|x|$ is so small that x^2 and higher powers of x may be neglected then find the approx-imate values of the following

$$\frac{\left(1-\frac{2x}{3}\right)^{3/2}(32+5x)^{1/5}}{(3-x)^3}$$

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9. If $|x|$ is so small that x^2 and higher powers of x may be neglected then find the approx-imate values of the following

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

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10. If $|x|$ is so small that x^2 and higher powers of x may be neglected then find the approx-imate values of the following

$$\frac{\sqrt{4+x}+\sqrt[3]{8+x}}{(1+2x)+(1-2x)^{-1/3}}$$

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11. If $|x|$ is so small that x^2 and higher powers of x may be neglected then find the approx-imate values of the following

$$\frac{(8+3x)^{2/3}}{(2+3x)\sqrt{4-5x}}$$

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12. Suppose s and t are positive and t is very small when compared to s. Then find an approximate value of

$$\left(\frac{s}{s+t}\right)^{1/3}-\left(\frac{s}{s-t}\right)^{1/3}.$$

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13. Suppose p, q are positive and p is very small when compared to q. Then find an approximate value of

$$\left(\frac{q}{q+p}\right)^{1/2}+\left(\frac{q}{q-p}\right)^{1/2}.$$

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14. By neglecting x^4 and higher powers of x, find an approximate value of $\sqrt[3]{x^2+64}-\sqrt[3]{x^2+27}$.

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15. Expand $3\sqrt{3}$ in increasing powers of $\frac{2}{3}$.

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