MATHS

BOOKS - PSEB

BINOMIAL THEOREM

Exercise

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1. Expand the expressions given below:-

$(1 - 2x)^5$

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2. Expand the expressions given below:-

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

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3. Expand the expressions given below:-

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

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4. Expand the expressions given below:-

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

5. Expand the expressions given below:-

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

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

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7. Using binomial theorem, evaluate the following: $(102)^5$

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

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

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

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

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

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

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

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

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

17. Write the general term in the expansion of

$$\left(x^2 - y\right)^6$$

18. Write the general term in the expansion of

$$\left(x^2 - yx\right)^{12}, x \neq 0.$$

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

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

21. Find the middle terms in the expansion of:-

$$\left(3 - \frac{x^3}{6}\right)^7$$

22. Find the middle terms in the expansion of:-

$$\left(\frac{x}{3} + 9y\right)^{10}.$$

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

24. The coefficients of the $(r - 1)^{th}, r^{th}$ and $(r + 1)^{th}$ terms in the expansion of $(x + 1)^n$ are in the ratio 1:3:5. Find n and r.

25. 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 $(1 + x)^{2n-1}$

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

27. 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.

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

29. Find the coefficient of x^5 in the product $(1 + 2x)^6(1 - x)^7$ using binomial theorem.

30. 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. [Hint write $a^n = (a - b + b)^n$ and expand]

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

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

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

34. 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 $\sqrt{6} : 1$.

35. Expand using Binomial Theorem $\left(1 + \dfrac{x}{2} - \dfrac{2}{x} \right)^4, x \neq 0.$

36. Find the expansion of $\left(3x^2 - 2ax + 3a^2\right)^3$

using binomial theorem.