



MASENO SCHOOL

Topic 9: BINOMIAL EXPANSION

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1. Expand $(2+x)^5$ in descending powers of x up to the 4th term hence evaluate 2.02^5 .
2. Expand $(1+a)^6$ up to the 5th term hence evaluate 0.8^6 .
3. Expand $(1-3x)^5$ up to the term containing x^3 hence evaluate 0.97^5 correct to 4 significant figures.
4. Expand $(3+2x)^6$ up to the fourth term hence evaluate 2.94^6 correct to four decimal places.
5. Expand $\left(2+\frac{3}{x}\right)^5$ hence find the exact value of 9.5^5 .
6. Expand $\left(x-\frac{1}{x}\right)^6$ up to the term independent of x hence estimate the value of $\left(2\frac{2}{3}\right)^6$.
7. Express $\left(2-\frac{1}{x}\right)^8$ in descending powers of x up to the fifth term hence evaluate 2.04^8 .
8. Expand $\left(2-\frac{1}{5}x\right)^7$ up to the fifth term hence evaluate 1.08^7 correct to 4 decimal places.
9. Expand and simplify $(3x-y)^4$ hence evaluate $(1.5-0.2)^4$.
10. Write down the first five terms of the expansion $\left(1-\frac{x}{3}\right)^7$ hence evaluate 1.02^7 to 4 decimal places
11. Expand $\left(3x-\frac{y}{3}\right)^4$ completely, hence by substituting suitable values of x and y , evaluate 29.5^4 .
12. Expand $\left(x+\frac{3}{x}\right)^5$ in ascending powers of x hence use the expansion to evaluate 10.3^5 .
13. Expand $\left(10+\frac{2}{x}\right)^5$ hence evaluate 14^5
14. Expand $(9x^2+6x+1)^3$ hence evaluate 1.96^6 correct to five significant figures.
15. Expand and simplify the expression $\left(a+\frac{1}{2}\right)^6 + \left(a-\frac{1}{2}\right)^6$
16. Use binomial expansion to evaluate $\left(2+\frac{1}{\sqrt{2}}\right)^5 + \left(2-\frac{1}{\sqrt{2}}\right)^5$
17. The sides of a square are $(3+\sqrt{2})^3$ cm and its hypotenuse is h cm. Without using a calculator, find h^2 .
18. Express $\frac{\sqrt{2}}{5\sqrt{2}-7}$ in the form $a+b\sqrt{c}$ where a , b and c are integers, hence evaluate $\left(\frac{\sqrt{2}}{5\sqrt{2}-7}\right)^4$
19. Given that $(2+ax)^n = 128 - \frac{448}{3}x + px^2 - \dots$, find the values of a , n and p .
20. The coefficient of x^4 in the expansion $\left(a-\frac{x}{4}\right)^9$ is $\frac{63}{4}$. Determine the 8th term.

Answers

1. $x^5 + 10x^4 + 40x^3 + 80x^2 + 80x + 32$, put $x = 0.02$, 33.6323216
2. $1 + 6a + 15a^2 + 20a^3 + 15a^4$, put $a = -0.2$, 0.264
3. $1 - 15x + 90x^2 - 270x^3$, put $x = 0.01$, 0.8587
4. $729 + 2916x + 4860x^2 + 4320x^3$, put $x = -0.03$, 645.7774
5. $32 + 240x^{-1} + 720x^{-2} + 1080x^{-3} + 810x^{-4} + 243x^{-5}$, put $x = 0.4$, $77378\frac{3}{32}$
6. $x^6 - 6x^4 + 15x^2 - 20$, put $x = 3$, 358
7. $256 - 1024x^{-1} + 1792x^{-2} - 1792x^{-3} + 1120x^{-4}$, put $x = -25$, 299.9447552
8. $128 - \frac{448}{5}x + \frac{672}{25}x^2 - \frac{112}{25}x^3 + \frac{56}{125}x^4$, put $x = 4.6$, 49.1455
9. $81x^4 - 108x^3y + 54x^2y^2 - 12xy^3 + y^4$, put $x = 0.5, y = 0.2$, 2.8561
10. $1 - \frac{7}{3}x + \frac{7}{3}x^2 - \frac{35}{27}x^3 + \frac{35}{81}x^4$, put $x = -0.06$, 1.1486856
11. $81x^4 - 36x^3y + 6x^2y^2 - \frac{4}{9}xy^3 + \frac{1}{81}y^4$, put $x = 10, y = 1.5$, 757335.0625
12. $x^5 + 15x^3 + 90x + \frac{270}{x} + \frac{405}{x^3} + \frac{243}{x^5}$, put $x = 10$, 115927.4074
13. $100000 + \frac{100000}{x} + \frac{40000}{x^2} + \frac{8000}{x^3} + \frac{800}{x^4} + \frac{32}{x^5}$, put $x = 0.5$, 537824
14. $[(3x+1)^2]^3 = (3x+1)^6 = 729^6 + 1458x^5 + 1215x^4 + 540x^3 + 135x^2 + 18x + 1$, put $x = 0.32$, 56.69391238
15. $2a^6 + \frac{15}{2}a^4 + \frac{15}{8}a^2 + \frac{1}{32}$
16. $\frac{401}{4}\sqrt{2}$
17. $7414 + 5220\sqrt{2}$
18. $78404 + 55440\sqrt{2}$
19. $n = 7, a = -\frac{1}{3}, p = \frac{224}{3}$
20. $a = 2, 8^{\text{th}} \text{ term} = -\frac{9}{1024}x^7$