BINOMIAL THEOREM – 1

Using binomial theorem, expand each of the following:

1. $(1-2x)^5$ **2.** $(2x-3)^6$ **3.** $(3x+2y)^5$

4. $(2x-3y)^4$ **5.** $\left(\frac{2x}{3}-\frac{3}{2x}\right)^6$ **6.** $\left(x^2-\frac{2}{x}\right)^7$

7. $\left(x-\frac{1}{y}\right)^5$ **8.** $(\sqrt{x}+\sqrt{y})^8$ **9.** $(\sqrt[3]{x}-\sqrt[3]{y})^6$

10. $(1+2x-3x^2)^4$ **11.** $\left(1+\frac{x}{2}-\frac{2}{x}\right)^4, x\neq 0$ **12.** $(3x^2-2ax+3a^2)^3$

Evaluate:

13. $(\sqrt{2}+1)^6+(\sqrt{2}-1)^6$ **14.** $(\sqrt{3}+1)^5-(\sqrt{3}-1)^5$

15. $(2+\sqrt{3})^7+(2-\sqrt{3})^7$ **16.** $(\sqrt{3}+\sqrt{2})^6-(\sqrt{3}-\sqrt{2})^6$

17. Prove that $\sum_{r=0}^{n} {}^nC_r \cdot 3^r = 4^n$.

18. Using binomial theorem, evaluate each of the following:

(i) $(101)^4$ (ii) $(98)^4$ (iii) $(1.2)^4$

19. Using binomial theorem, prove that $(2^{3n}-7n-1)$ is divisible by 49, where $n \in N$.

20. Prove that $(2+\sqrt{x})^4+(2-\sqrt{x})^4 = 2(16+24x+x^2)$.

1. $1-10x+40x^2-80x^3+80x^4-32x^5$

2. $64x^6-576x^5+2160x^4-4320x^3+4860x^2-2916x+729$

3. $243x^5+810x^4y+1080x^3y^2+720x^2y^3+240xy^4+32y^5$

4. $16x^4-96x^3y+216x^2y^2-216xy^3+81y^4$

5. $\frac{64x^6}{729}-\frac{32x^4}{27}+\frac{20x^2}{3}-20+\frac{135}{4x^2}-\frac{243}{8x^4}+\frac{729}{64x^6}$

6. $x^{14}-14x^{11}+84x^8-280x^5+560x^2-\frac{672}{x}+\frac{448}{x^4}-\frac{128}{x^7}$

7. $x^5-\frac{5x^4}{y}+\frac{10x^3}{y^2}-\frac{10x^2}{y^3}+\frac{5x}{y^4}-\frac{1}{y^5}$

8. $x^4+8x^{7/2}y^{1/2}+28x^3y+56x^{5/2}y^{3/2}+70x^2y^2+56x^{3/2}y^{5/2}+28xy^3+8x^{1/2}y^{7/2}+y^4$

9. $x^2-6x^{5/3}y^{1/3}+15x^{4/3}y^{2/3}-20xy+15x^{2/3}y^{4/3}-6x^{1/3}y^{5/3}+y^2$

10. $81x^8-216x^7+108x^6+120x^5-74x^4-40x^3+12x^2+8x+1$

11. $\frac{x^4}{16}+\frac{x^3}{2}+\frac{x^2}{2}-4x-5+\frac{16}{x}+\frac{8}{x^2}-\frac{32}{x^3}+\frac{16}{x^4}$

12. $27x^6-54ax^5+117a^2x^4-116a^3x^3+117a^4x^2-54a^5x+27a^6$

13. 198 **14.** 152 **15.** 10084 **16.** $396\sqrt{6}$

18. (i) 104060401 (ii) 92236816 (iii) 2.0736