Binomial Theorem MCQs - Class 11 Mathematics

Prepared for Entry Test Preparation

Multiple Choice Questions

1. The number of terms in the expansion of $(2x - y)^6$ is:

(a) 6

(b) 7

(c) 8

(d) 5

2. The coefficient of x^2 in the expansion of $(1 + 2x)^5$ is:

(a) 80

(b) 40

(c) 20

(d) 10

3. The sum of binomial coefficients $\binom{8}{0} + \binom{8}{1} + \cdots + \binom{8}{8}$ is:

(a) 256

(b) 128

(c) 64

(d) 512

4. The sum of odd binomial coefficients in $(x + y)^7$ is:

(a) 64

(b) 128

(c) 256

(d) 32

5. The value of $(0.99)^3 = (1 - 0.01)^3$ is approximately:

(a) 0.970299

(b) 0.912673

(c) 0.950990

(d) 0.990000

6. The simplified form of $(a + \sqrt{3}x)^4 + (a - \sqrt{3}x)^4$ is:

(a) $2a^4 + 24a^2x^2 + 18x^4$

(b) $2a^4 + 12a^2x^2 + 8x^4$

(c) $a^4 + 24a^2x^2 + 18x^4$

(d) $2a^4 + 18a^2x^2 + 24x^4$

7. The term involving x^3 in the expansion of $(2 - x)^6$ is:

(a) $-160x^3$

(b) $160x^3$

(c) $-80x^3$

(d) $80x^3$

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

(a) 252

(b) -252

(c) -120

(d) 120

9. The middle term in the expansion of $\left(\frac{x}{2} - \frac{2}{x}\right)^8$ is:

(a) $70x^0$

(b) $-70x^0$

(c) $140x^2$

(d) $-140x^2$

10. The term independent of x in $\left(\sqrt{x} - \frac{2}{x}\right)^8$ is:

(a) 112

(b) -112

(c) 70

(d) -70

11. The coefficient of x^5 in $\left(x^2 - \frac{2}{x}\right)^8$ is:

(a) 896

(b) -896

(c) 448

(d) -448

12. The value of $(2 + \sqrt{2})^4 + (2 - \sqrt{2})^4$ is:

(a) 100

(b) 196

(c) 164

(d) 132

13. The 5th term in the expansion of $\left(x - \frac{1}{x}\right)^7$ is:

(a) $35x^3$

(b) $-35x^3$

(c) $35x^{-3}$

(d) $-35x^{-3}$

14. The sum $\binom{6}{0} + \frac{1}{2}\binom{6}{1} + \frac{1}{3}\binom{6}{2} + \cdots + \frac{1}{7}\binom{6}{6}$ equals:

(a) $\frac{127}{7}$

(b) $\frac{255}{7}$

(c) $\frac{63}{7}$

(d) $\frac{128}{7}$

15. The coefficient of x^6 in the expansion of $(1 - x + x^2)^4$ is:

(a) 10

(b) 19

(c) 16

(d) 12

16. The term involving y^2 in $\left(x - \sqrt{y}\right)^{10}$ is:

(a) $45x^8y$

(b) $-45x^8y$

(c) $10x^8y$

(d) $-10x^8y$

17. The middle term in $(1 + x)^{10}$ is:

(a) $252x^5$

(b) $210x^5$

(c) $252x^6$

(d) $210x^6$

18. The coefficient of x^n in $\left(x^2 - \frac{1}{x}\right)^{2n}$ is:

(a) $\binom{2n}{n}(-1)^n$

(b) $\binom{2n}{n}$

(c) $\binom{2n}{n-1}(-1)^n$

(d) $\binom{2n}{n-1}$

19. The 4th term from the end in $\left(x - \frac{1}{x}\right)^6$ is:

(a) $20x^{-1}$

(b) $-20x^{-1}$

(c) $15x^{-1}$

(d) $-15x^{-1}$

20. The value of $(1+i)^4-(1-i)^4$ is:

(a) $8i$

(b) $-8i$

(c) $16i$

(d) $-16i$

Solutions and Explanations

1. Answer: b 7 *Explanation*: Number of terms in $(a+x)^n$ is $n+1$. For $n=6$, $6+1=7$.

2. Answer: a 80 *Explanation*: General term: $T_{r+1}=\binom{5}{r}(1)^{5-r}(2x)^r=\binom{5}{r}2^r x^r$. For x^2, $r=2$: $\binom{5}{2}2^2=10\cdot 4=40$.

3. Answer: a 256 *Explanation*: Sum of binomial coefficients: $\sum_{r=0}^{8}\binom{8}{r}=2^8=256$ (Q.13).

4. Answer: a 64 *Explanation*: Sum of odd coefficients: $\binom{7}{1}+\binom{7}{3}+\binom{7}{5}=2^{7-1}=64$ (Q.13).

5. Answer: a 0.970299 *Explanation*: $(1-0.01)^3=1-3(0.01)+3(0.01)^2-(0.01)^3=1-0.03+0.0003-0.000001=0.970299$ (Q.2).

6. Answer: a $2a^4+24a^2x^2+18x^4$ *Explanation*: $(a+\sqrt{3}x)^4+(a-\sqrt{3}x)^4=2a^4+12a^2(3x^2)+2(9x^4)=2a^4+24a^2x^2+18x^4$ (Q.3).

7. Answer: a $-160x^3$ *Explanation*: General term: $\binom{6}{r}2^{6-r}(-x)^r=\binom{6}{r}2^{6-r}(-1)^r x^r$. For x^3, $r=3$: $\binom{6}{3}2^3(-1)^3=20\cdot 8\cdot(-1)=-160$ (Q.6).

8. Answer: b -252 *Explanation*: General term: $\binom{10}{r}x^{10-r}\left(-\frac{1}{x}\right)^r=\binom{10}{r}(-1)^r x^{10-2r}$. For x^{-2}, $10-2r=-2$, so $r=6$: $\binom{10}{6}(-1)^6=252$ (Q.9).

9. Answer: b $-70x^0$ *Explanation*: For $n=8$, middle term is $\left(\frac{8}{2}+1\right)^{\text{th}}=5^{\text{th}}$, $r=4$: $\binom{8}{4}\left(\frac{x}{2}\right)^{8-4}\left(-\frac{2}{x}\right)^4=70\cdot\frac{x^4}{16}\cdot\frac{16}{x^4}=70\cdot 1=-70$ (Q.10).

10. Answer: b -112 *Explanation*: General term: $\binom{8}{r}x^{\frac{8-r}{2}}\left(-\frac{2}{x}\right)^r=\binom{8}{r}(-2)^r x^{\frac{8-r}{2}-r}$. For x^0, $\frac{8-r}{2}-r=0$, so $r=4$: $\binom{8}{4}(-2)^4=70\cdot 16=-112$ (Q.9).

11. Answer: b -896 *Explanation*: General term: $\binom{8}{r}(x^2)^{8-r}\left(-\frac{2}{x}\right)^r=\binom{8}{r}(-2)^r x^{16-2r-r}$. For x^5, $16-3r=5$, so $r=4$: $\binom{8}{4}(-2)^4=70\cdot 16\cdot(-1)^4=-896$ (Q.7).

12. Answer: c 164 *Explanation*: $(2+\sqrt{2})^4+(2-\sqrt{2})^4=2\cdot 2^4+12\cdot 2^2\cdot 2+2\cdot 4=32+96+36=164$ (Q.3).

13. **Answer: d** $-35x^{-3}$ *Explanation*: 5th term, $r=4$: $\binom{7}{4}x^{7-4}\left(-\frac{1}{x}\right)^4 = 35\cdot x^3\cdot\frac{1}{x^4} = 35\cdot x^{-3}\cdot(-1)^4 = -35x^{-3}$ (Q.6).

14. **Answer: a** $\frac{127}{7}$ *Explanation*: $\sum_{r=0}^{6}\frac{1}{r+1}\binom{6}{r} = \frac{1}{7}\sum_{r=0}^{6}\binom{7}{r+1} = \frac{2^7-1}{7} = \frac{127}{7}$ (Q.14).

15. **Answer: a** 10 *Explanation*: From Q.4, expansion of $(1-x+x^2)^4$, coefficient of x^6 is 10 (Q.4(ii)).

16. **Answer: b** $-45x^8y$ *Explanation*: General term: $\binom{10}{r}x^{10-r}(-\sqrt{y})^r = \binom{10}{r}(-1)^r x^{10-r}y^{\frac{r}{2}}$. For y^2, $\frac{r}{2}=2$, so $r=4$: $\binom{10}{4}(-1)^4x^6y^2 = 45x^8y$ (Q.6).

17. **Answer: a** $252x^5$ *Explanation*: For $n=10$, middle term is $\left(\frac{10}{2}+1\right)^{\text{th}} = 6^{\text{th}}$, $r=5$: $\binom{10}{5}1^{10-5}x^5 = 252x^5$ (Q.12).

18. **Answer: a** $\binom{2n}{n}(-1)^n$ *Explanation*: From Q.7(ii), general term: $\binom{2n}{r}(x^2)^{2n-r}\left(-\frac{1}{x}\right)^r = \binom{2n}{r}(-1)^r x^{4n-3r}$. For x^n, $4n-3r=n$, so $r=n$: $\binom{2n}{n}(-1)^n$.

19. **Answer: b** $-20x^{-1}$ *Explanation*: 4th term from end in $(x-\frac{1}{x})^6$, $r=3$: $\binom{6}{3}x^{6-3}\left(-\frac{1}{x}\right)^3 = 20\cdot x^3\cdot\frac{-1}{x^3} = -20x^{-1}$ (Q.11).

20. **Answer: c** $16i$ *Explanation*: $(1+i)^4-(1-i)^4 = 2\cdot(4\cdot i+4\cdot i^3) = 2\cdot(4i-4i) = 16i$ (Q.3).