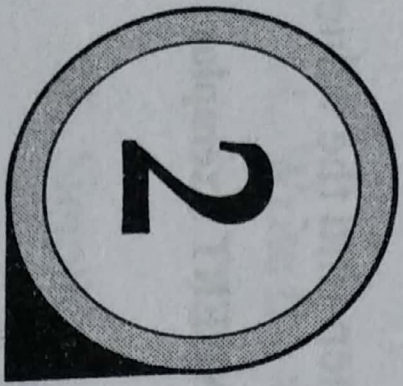


# Mathematics





# POLYNOMIALS

1. Find the remainder when  $4x^3 - 3x^2 + 4x - 2$  is divided by

(i)  $x + 2$                       (ii)  $x + \frac{1}{2}$

2. Examine whether  $x - 1$  is a factor of the following polynomials:

(i)  $4x^3 + 3x^2 - 4x - 3$   
(ii)  $x^3 - 3x^2 - 9x + 5$

3. Find the value of  $k$ , if  $x + k$  is factor of the polynomials:

(i)  $x^3 - (k^2 - 1)x + 3$   
(ii)  $-4x^3 + 4x^2 + 4kx - k$

4. Show that whether  $g(x)$  is a factor of the polynomials:

(i)  $f(x) = 2\sqrt{2}x^2 - 5\sqrt{x} - 3\sqrt{2}$ ;  $g(x) = x - 2$   
(ii)  $f(x) = 2x^4 - 12x^3 + 18x + 14$ ;  $g(x) = x - 2$   
(iii)  $f(x) = 7x^2 - 2\sqrt{8}x - 6$ ;  $g(x) = x - \sqrt{2}$

5. Find the value of  $a$  and  $b$  so that polynomial  $p(x) = x^3 - 3x^2 - ax + b$  has  $(x + 1)$  and  $(x - 5)$  as factors.

6. Factorise:

(i)  $y^3 - 7y + 6$   
(ii)  $2x^3 - 5x^2 - 19x + 42$   
(iii)  $3x^3 - 4x^2 - 12x + 16$   
(iv)  $x^3 - 6x^2 + 11x - 6$

[CBSE 2016]

7. By actual division, find the quotient and remainder when  $3x^4 - 4x^3 - 3x - 1$  is divided by  $x + 1$ .

[CBSE 2016]

8. If the polynomial  $f(x) = px^3 + 4x^2 + 3x - 4$  and  $g(x) = x^3 - 4 + p$  are divided by  $(x - 3)$ , then the remainder in each case is the same. Find the value of  $p$ .

[CBSE 2011]

9. Find the value of  $m$  and  $n$  so that the polynomial  $f(x) = x^3 - 6x^2 + mx - n$  is exactly divisible by  $(x - 1)$  as well as  $(x - 2)$ .

[CBSE 2011]

10. The polynomial  $p(x) = 2x^3 + kx^2 - 3x + 5$  and  $q(x) = x^3 + 2x^2 - x + k$ , when divided by  $(x - 2)$  leave the same remainder  $r_1$  and  $r_2$  respectively. Find the value of  $k$ , if  $r_1 - r_2 = 0$

[CBSE 2016]

1. Prove that:

$$(x-y)^3 + (y-z)^3 + (z-x)^3 = 3(x-y)(y-z)(z-x)$$

2. Find the value of  $x^3 - 27y^3 - 343 - 63xy$ , when  $x = 3y + 7$

3. If  $x + y + z = 6$  and  $xy + yz + zx = 12$ , then show that:  $x^3 + y^3 + z^3 = 3xyz$

4. Find the following products by using suitable identities:

(i)  $(x + 2y)(x^2 - 2xy + 4y^2)$

(ii)  $(\sqrt{x} - \sqrt{y})(\sqrt{x} + \sqrt{y})$

5. Evaluate the following products by using suitable identities only:

(i)  $99^2$

(ii)  $99^3$

(iii)  $1000^3 - 999^3$

## Very Short Answer Type Questions [1 Mark]

1. Give an example of a polynomial.
2. Find the degree of polynomial  $\sqrt{2}$ .
3. Find the degree of the polynomial  $4x^4 + 0x^3 + 0x^5 + 5x + 7$ . [NCERT Exemplar]
4. Find the degree of the zero polynomial.
5. If  $p(x) = x^2 - 2\sqrt{2}x + 1$ , then find the value of  $p(2\sqrt{2})$ . [NCERT Exemplar]
6. Find the value of the polynomial  $5x - 4x^2 + 3$ , when  $x = -1$ . [NCERT Exemplar]
7. If  $p(x) = x + 3$ , then find the value of  $p(x) + p(-x)$ .
8. Find the zero of the zero polynomial.
9. Find the zero of the polynomial  $p(x) = 2x + 5$ .
10. Find the zero of the polynomial  $2x^2 + 7x - 4$ .

## Short Answer Type Questions I [2 Marks]

11. If  $x^{51} + 51$  is divided by  $x + 1$ , then find the remainder. [NCERT Exemplar]
12. If  $x + 1$  is a factor of the polynomial  $2x^2 + kx$ , then find the value of  $k$ . [NCERT Exemplar]
13. Check whether  $x + 1$  is a factor of the polynomial  $x^3 + x^2 + x + 1$ . [NCERT Exemplar]
14. Find the factor of  $(25x^2 - 1) + (1 + 5x)^2$ .
15. Find the value of  $249^2 - 248^2$ .

16. Factorise  $4x^2 + 8x + 3$ .

17. Find a factor of  $(x + y)^3 - (x^3 + y^3)$ .

18. Find the coefficient of  $x$  in the expansion of  $(x + 3)^3$ .

19. If  $\frac{x}{y} + \frac{y}{x} = -1$  ( $x, y \neq 0$ ), then find the value of  $x^3 - y^3$ .

20. If  $49x^2 - b = \left(7x + \frac{1}{2}\right)\left(7x - \frac{1}{2}\right)$ , then find the value of  $b$ . [NCERT Exemplar]

21. If  $a + b + c = 0$ , then find the value of  $a^3 + b^3 + c^3$ .

## Short Answer Type Questions II [3 Marks]

22. Find the value of polynomial  $3x^3 - 4x^2 + 7x - 5$  when  $x = 3$  and when  $x = -3$ .

23. If  $p(x) = x^2 - 4x + 3$  then evaluate  $p(2) - p(-1) + p\left(\frac{1}{2}\right)$ .

24. Find the zeroes of the polynomial  $p(x) = (x - 2)^2 - (x + 2)^2$ .

25. Show that  
(i)  $x + 3$  is a factor of  $69 + 11x - x^2 + x^3$   
(ii)  $2x - 3$  is a factor of  $x + 2x^3 - 9x^2 + 12$

26. Show that  $p - 1$  is a factor of both  $p^{10} - 1$  and  $p^{11} - 1$ .

27. For what value of  $m$  is  $x^3 - 2mx^2 + 16$  is divisible by  $x + 2$ ?

## ASSESS YOURSELF

1. Give an example of a cubic polynomial.
2. Find the degree of polynomial  $4x^3 + 9x - 6x^5$ .
3. Find the coefficient of  $x^3$  in the expression  
 $p(x) = (3x - 4)(x^2 + 5x - 1)$ .
4. Find the zeroes of  $x^2 - 2x$ .
5. Find the value of  $346^2 - 345^2$ .
6. Classify the following as linear, quadratic, cubic and constant polynomials:  
(i)  $5x - 2\sqrt{2}$       (ii)  $9 - 8u^2$   
(iii)  $8 - x^3 + 2x^2$       (iv)  $7$
7. Find the zero of the polynomial  
 $p(x) = (x - 4)^2 - (x - 6)^2$ .
8. By remainder theorem, find the remainder when  
 $p(x) = 4x^3 - 3x^2 + 2x - 5$  is divided by  $g(x) = 1 - 2x$ .
9. If  $y + 1$  is a factor of  $ky^3 + y^2 - 2y + 4k - 10$ , then find the value of  $k$ .
0. Factorise:  
(i)  $42 - x - x^2$       (ii)  $16x^2 + 25 - 40x$

11. Factorise:  $2x^3 - x^2 - 13x - 6$ .
12. Evaluate the following by using suitable identity:  
(i)  $101 \times 99$       (ii)  $999^3$
13. Without actually calculating the cubes, find the value of  
(i)  $(-14)^3 + 8^3 + 6^3$   
(ii)  $27^3 + (-14)^3 + (-13)^3$
14. If  $3x - 2y = 13$  and  $xy = 5$ , find the value of  $27x^3 - 8y^3$ .
15. Simplify:  $(p + q)^3 - (p - q)^3 - 6q(p^2 - q^2)$ .
16. When  $f(y) = y^4 - 4y^3 + 8y^2 - my + n$  is divided by  $y + 1$  and  $y - 1$ , we get remainder as 10 and 16 respectively. Find the remainder if  $f(y)$  is divided by  $y - 3$ .
17. If  $x^2 - 1$  is a factor of  $px^4 + qx^3 + rx^2 + sx + u$ , show that  $p + r + u = q + s = 0$ .
18. If  $x^2 + \frac{1}{x^2} = 66$ , find the value of  $x^3 - \frac{1}{x^3}$ .
19. What must be added to  $x^4 + 2x^3 - 2x^2 + x - 1$ . So that result is exactly divisible by  $x^2 + x - 2$ ?
20. Using factor theorem, factorise the polynomial  
 $x^4 - x^3 - 7x^2 + x + 6$ .