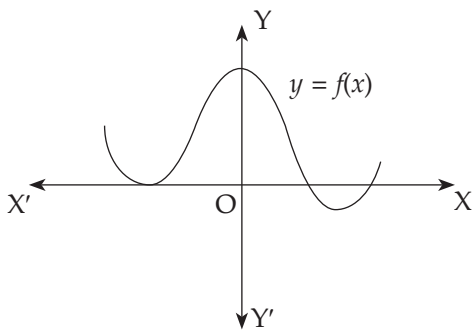
WORKSHEET 1

CHAPTER 2 – POLYNOMIALS

1. Find the zeroes of the quadratic polynomial $2x^2 - 11x + 15$ and verify the relation between the zeroes and its coefficients.
2. If two zeroes of the polynomial $f(x) = x^4 - 6x^3 - 26x^2 + 138x - 35$ are $2 + \sqrt{3}$ and $2 - \sqrt{3}$, find other zeroes.
3. If α and β are the zeroes of the quadratic polynomial $f(x) = ax^2 + bx + c$, then evaluate:

   (*i*) $\alpha^2 + \beta^2$ (*ii*) $\alpha^3 + \beta^3$ (*iii*) $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ (*iv*) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
4. Find the zeroes of the polynomial $f(x) = x^3 - 5x^2 - 2x + 24$, if it is given that the product of its two zeroes is 12.
5. What must be added to the polynomial $f(x) = x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is exactly divisible by $x^2 + 2x - 3$?
6. The graph of a polynomial $f(x)$ is as shown below. Write the number of real zeroes of $f(x)$.



7. If $f(x) = x^3 + x^2 - ax + b$ is divisible by $x^2 - x$, then write the values of a and b.
8. Find the zeroes of the quadratic polynomial $f(x) = abx^2 + (b^2 - ac)x - bc$ and verify the relationship between the zeroes and its coefficients.
9. If α and β are the zeroes of the polynomial $f(x) = x^2 + 5x + k$ such that $\alpha - \beta = 1$, find the value of k.
10. Find the zeroes of the polynomial $f(x) = x^3 - 12x^2 + 39x - 28$, if it is given that the zeroes are in A.P.
11. Find a cubic polynomial with the sum, sum of the product of its zeroes taken two at a time and product of its zeroes as 3, –1 and –3 respectively.
12. By applying division algorithm, prove that the polynomial $g(x) = x^2 + 3x + 1$ is a factor of the polynomial $f(x) = 3x^4 + 5x^3 - 7x^2 + 2x + 2$.
13. Find the values of a and b so that $x^4 + x^3 + 8x^2 + ax + b$ is divisible by $x^2 + 1$.
14. Divide $5x^3 - 13x^2 + 21x - 14$ by $3 - 2x + x^2$ and verify division algorithm.
15. If the polynomial $x^4 + 2x^3 + 8x^2 + 12x + 18$ is divided by another polynomial $x^2 + 5$, the remainder comes out to be $px + q$. Find the values of p and q.
16. Find a quadratic polynomial whose zeroes are $\frac{2}{3}$ and $\frac{-1}{4}$. Verify the relation between the coefficients and the zeroes of the polynomial.

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17. Find the zeroes of the polynomial $f(x) = x^3 - 5x^2 - 16x + 80$, if its two zeroes are equal in magnitude but opposite in sign.

18. Obtain all zeroes of the following polynomials:

(*i*) $f(x) = 2x^4 + x^3 - 14x^2 - 19x - 6$, if two of its zeroes are –2 and –1.

(*ii*) $f(x) = x^3 + 13x^2 + 32x + 20$, if one of its zeroes is –2.

(*iii*) $f(x) = x^4 - 3x^3 - x^2 + 9x - 6$, if two of its zeroes are $-\sqrt{3}$ and $\sqrt{3}$.

(*iv*) $f(x) = 2x^3 + x^2 - 6x - 3$, if two of its zeroes are $-\sqrt{3}$ and $\sqrt{3}$.

19. Divide the following polynomials $f(x)$ by the polynomials $g(x)$ and find the remainders:

(*i*) $f(x) = 14x^3 - 5x^2 + 9x - 1$; $g(x) = 2x - 1$

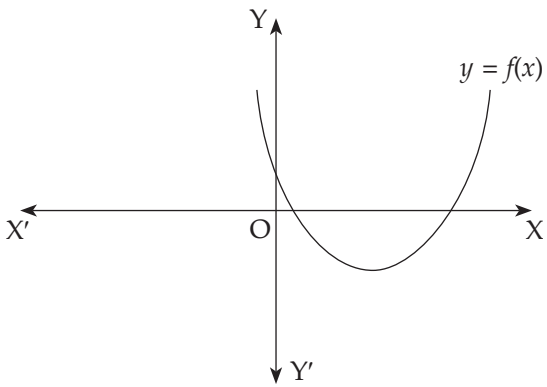
(*ii*) $f(x) = 6x^3 + 11x^2 - 39x - 65$; $g(x) = x^2 - 1 + x$

(*iii*) $f(x) = 9x^4 - 4x^2 + 4$; $g(x) = 3x^2 + x - 1$

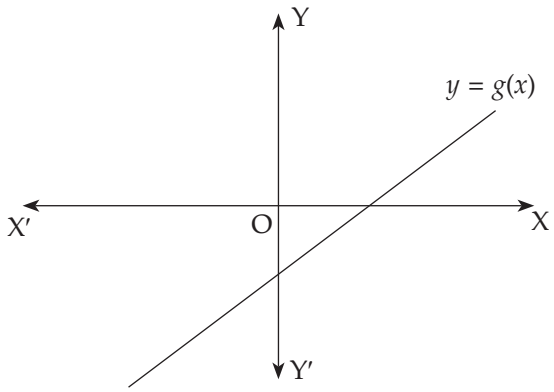
(*iv*) $f(x) = 30x^4 + 11x^3 - 82x^2 - 12x + 48$; $g(x) = 3x^2 + 2x - 4$

20. If each of the following graphs is the graph of a polynomial, then identify which one corresponds to a linear polynomial and which one corresponds to a quadratic polynomial:

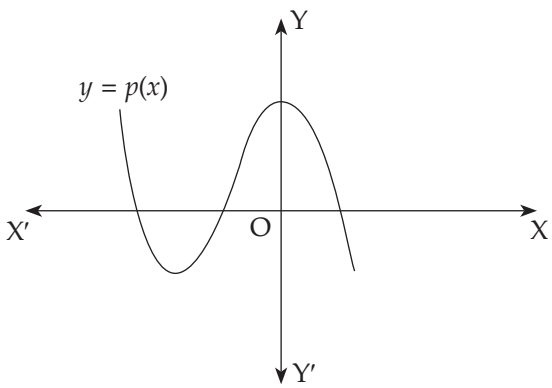
(*i*)



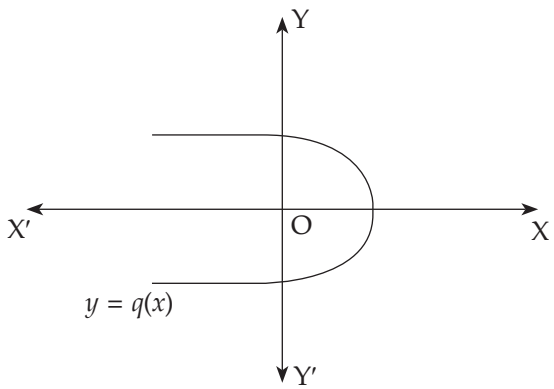
(*ii*)



(*iii*)



(*iv*)



ANSWERS

WORKSHEET 1

1. 3, $\frac{5}{2}$

2. 7, – 5

3. (*i*) $\frac{b^2-2ac}{a^2}$ (*ii*) $\frac{3abc-b^3}{a^3}$ (*iii*) $\frac{3abc-b^3}{a^2c}$ (*iv*) $\frac{b^2-2ac}{ac}$

4. 3, 4, – 2

5. $x - 2$

6. 3

7. $a = 2, b = 0$

8. $\frac{-b}{a}, \frac{c}{b}$

9. $k = 6$

10. 1, 4, 7

11. $k\,(x^3 - 3x^2 - x + 3)$, k is any non-zero real number

13. $a = 1, b = 7$

14. quotient = $5x - 3$, remainder = -5

15. $p = 2$ and $q = 3$

16. $12x^2 - 5x - 2$

17. 4, –4 and 5

18. (*i*) –1/2, 3, –2, –1 (*ii*) –10, –1, –2 (*iii*) $-\sqrt{3}, \sqrt{3}$, 1, 2 (*iv*) $-\sqrt{3}, \sqrt{3}, -1/2$

19. (*i*) 4 (*ii*) $-38x - 60$ (*iii*) $-x + 4$ (*iv*) 0

20. (*i*) quadratic polynomial (*ii*) linear polynomial
(*iii*) neither linear nor quadratic polynomial (*iv*) quadratic polynomial