

Polynomial

Previous Years' CBSE Board Questions

2.1 Introduction

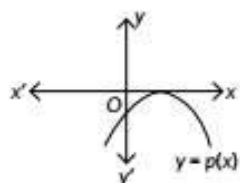
MCQ

- If one of the zeroes of a quadratic polynomial $(k - 1)x^2 + kx + 1$ is -3 , then the value of k is
 (a) $\frac{4}{3}$ (b) $-\frac{4}{3}$ (c) $\frac{2}{3}$ (d) $-\frac{2}{3}$
 (NCERT Exemplar, Term I, 2021-22) (Ap)
- The degree of polynomial having zeroes -3 and 4 only is
 (a) 2 (b) 1
 (c) more than 3 (d) 3 (2020) (U)
- If one of the zeroes of the quadratic polynomial $x^2 + 3x + k$ is 2 , then the value of k is
 (a) 10 (b) -10
 (c) -7 (d) -2 (2020)

2.2 Geometrical Meaning of the Zeroes of a Polynomial

MCQ

- The graph of $y = p(x)$ is given, for a polynomial $p(x)$. The number of zeroes of $p(x)$ from the graph is



- (a) 3 (b) 1 (c) 2 (d) 0 (2023)

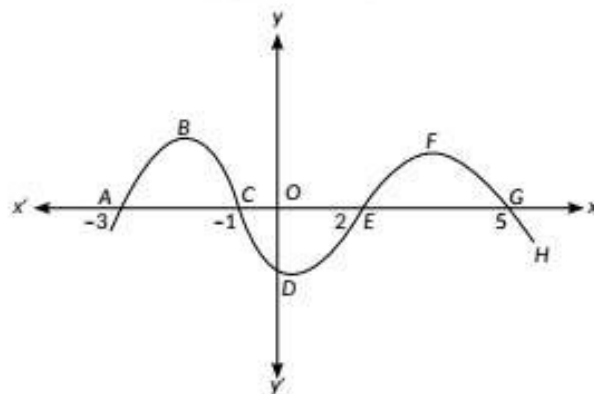
2.3 Relationship between Zeroes and Coefficients of a Polynomial

MCQ

- Which of the following is a quadratic polynomial with zeroes $\frac{5}{3}$ and 0 ?
 (a) $3x(3x - 5)$ (b) $3x(x - 5)$
 (c) $x^2 - \frac{5}{3}$ (d) $\frac{5}{3}x^2$ (2023)
- If α, β are the zeroes of a polynomial $p(x) = x^2 + x - 1$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ equals to
 (a) 1 (b) 2 (c) -1 (d) $-\frac{1}{2}$
 (2023)

- If α, β are zeroes of the polynomial $x^2 - 1$, then value of $(\alpha + \beta)$ is
 (a) 2 (b) 1 (c) -1 (d) 0 (2023)
- If α, β are the zeroes of the polynomial $p(x) = 4x^2 - 3x - 7$, then $(\frac{1}{\alpha} + \frac{1}{\beta})$ is equal to
 (a) $\frac{7}{3}$ (b) $-\frac{7}{3}$ (c) $\frac{3}{7}$ (d) $-\frac{3}{7}$
 (2023)

Case study : A car moves on a highway. The path it traces is given below :



Based on the above information, attempt any 4 questions from 9 to 13.

- What is the shape of the curve EFG?
 (a) Parabola (b) Ellipse
 (c) Straight line (d) Circle
 (Term I, 2021-22) (U)
- If the curve ABC is represented by the polynomial $-(x^2 + 4x + 3)$, then its zeroes are
 (a) 1 and -3 (b) -1 and 3
 (c) 1 and 3 (d) -1 and -3
 (Term I, 2021-22)
- If the path traced by the car has zeroes at -1 and 2 , then it is given by
 (a) $x^2 + x + 2$ (b) $x^2 - x + 2$
 (c) $x^2 - x - 2$ (d) $x^2 + x - 2$
 (Term I, 2021-22) (Ap)

12. The number of zeroes of the polynomial representing the whole curve, is
(a) 4 (b) 3 (c) 2 (d) 1
(Term I, 2021-22) (U)
13. The distance between C and G is
(a) 4 units (b) 6 units (c) 8 units (d) 7 units
(Term I, 2021-22)
14. The quadratic polynomial, the sum of whose zeroes is -5 and their product is 6, is
(a) $x^2 + 5x + 6$ (b) $x^2 - 5x + 6$
(c) $x^2 - 5x - 6$ (d) $-x^2 + 5x + 6$
(Term I, 2021-22, 2020)

VSA (1 mark)

15. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - x - 4$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$. (2021C)
16. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then find the value of k . (2021C) (EV)
17. If α, β are zeroes of the polynomial $2x^2 - 5x - 4$, then $\frac{1}{\alpha} + \frac{1}{\beta} =$ _____. (2020C) (Ap)
18. If α, β are zeroes of the polynomial $-3x^2 + x - 5$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is _____. (2020C)
19. Form a quadratic polynomial, the sum and product of whose zeroes are -3 and 2 respectively. (2020) (Ap)
20. Find the quadratic polynomial whose zeroes are 3 and -4 respectively. (Board Term I, 2015)

SA I (2 marks)

21. If one zero of the polynomial $p(x) = 6x^2 + 37x - (k - 2)$ is reciprocal of the other, then find the value of k . (2023)

22. If α and β are zeroes of the polynomial $x^2 - p(x + 1) + c$ such that $(\alpha + 1)(\beta + 1) = 0$, then find the value of c . (Board Term I, 2016) (Ap)
23. If α and β are zeroes of $4x^2 + 3x + 7$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$. (Board Term I, 2015) (EV)

SA II (3 marks)

24. Find a quadratic polynomial whose zeroes are reciprocals of the zeroes of the polynomial $f(x) = ax^2 + bx + c, a \neq 0, c \neq 0$. (2020) (EV)
25. Find the value of k such that the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ has sum of its zeroes equal to half of their product. (Delhi 2019)
26. Find the zeroes of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeroes and the coefficients. (2019)
27. Find the quadratic polynomial, sum and product of whose zeroes are -1 and -20 respectively. Also, find the zeroes of the polynomial so obtained. (2019)
28. If α and β are zeroes of $4x^2 - x - 4$, find quadratic polynomial whose zeroes are $\frac{1}{2\alpha}$ and $\frac{1}{2\beta}$. (Board Term I, 2017) (Gr)
29. If α and β are the zeroes of $p(x) = 6x^2 - 7x + 2$. Find the quadratic polynomial whose zeroes are $\frac{1}{\alpha}$ & $\frac{1}{\beta}$. (Board Term I, 2017)
30. Find the zeroes of quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients of the polynomial. (Board Term I, 2015) (Ap)

CBSE Sample Questions

2.3 Relationship between Zeroes and Coefficients of a Polynomial

MCQ

1. If α and β are the zeros of a polynomial $f(x) = px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$, then p is
(a) $-2/3$ (b) $2/3$
(c) $1/3$ (d) $-1/3$ (2022-23) (Ap)
2. If 2 and $1/2$ are the zeroes of $px^2 + 5x + r$, then
(a) $p = r = 2$ (b) $p = r = -2$
(c) $p = 2, r = -2$ (d) $p = -2, r = 2$
(Term I, 2021-22) (Ap)

Case study : The figure given alongside shows the path of a diver, when she takes a jump from the diving board. Clearly, it is a parabola.

Annie was standing on a diving board, 48 feet above the water level. She took a dive into the pool. Her height (in feet) above the water level at any time 't' (in seconds) is given by the polynomial $h(t)$ such that $h(t) = -16t^2 + 8t + k$.

Based on above information, attempt any 4 out of 5 subparts.

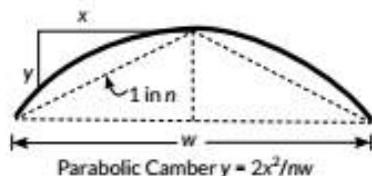


3. What is the value of k ?
 (a) 0 (b) -48 (c) 48 (d) $\frac{48}{-16}$
 (Term I, 2021-22)
4. At what time will she touch the water in the pool?
 (a) 30 seconds (b) 2 seconds
 (c) 1.5 seconds (d) 0.5 seconds
 (Term I, 2021-22) (U)
5. Rita's height (in feet) above the water level is given by another polynomial $p(t)$ with zeroes -1 and 2. Then $p(t)$ is given by
 (a) $t^2 + t - 2$ (b) $t^2 + 2t - 1$
 (c) $24t^2 - 24t + 48$ (d) $-24t^2 + 24t + 48$
 (Term I, 2021-22) (Ap)
6. A polynomial $q(t)$ with sum of zeroes as 1 and the product as -6 is modelling Anu's height in feet above the water at any time t (in seconds). Then $q(t)$ is given by
 (a) $t^2 + t + 6$ (b) $t^2 + t - 6$
 (c) $-8t^2 + 8t + 48$ (d) $8t^2 - 8t + 48$
 (Term I, 2021-22)
7. The zeroes of the polynomial $r(t) = -12t^2 + (k - 3)t + 48$ are additive inverse of each other. Then k is
 (a) 3 (b) 0 (c) -1.5 (d) -3
 (Term I, 2021-22) (Ev)

8. **Case Study : Applications of Parabolas-Highway Overpasses/Underpasses**
 A highway underpasses is parabolic in shape.



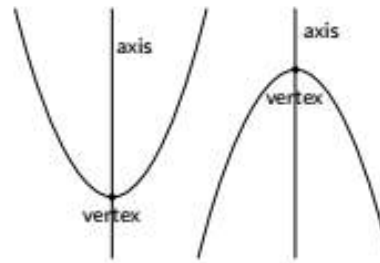
Shape of Cross Slope :



Parabola

A parabola is the graph that results from $p(x) = ax^2 + bx + c$. Parabolas are symmetric about a vertical line known as the Axis of Symmetry.

The Axis of Symmetry runs through the maximum or minimum point of the parabola which is called the Vertex.



Based on above information, attempt any 4 out of 5 subparts.

- (i) If the highway overpass is represented by $x^2 - 2x - 8$. Then its zeroes are
 (a) (2, -4) (b) (4, -2)
 (c) (-2, -2) (d) (-4, -4)
- (ii) The highway overpass is represented graphically. Zeroes of a polynomial can be expressed graphically. Number of zeroes of polynomial is equal to number of points where the graph of polynomial
 (a) Intersects x-axis
 (b) Intersects y-axis
 (c) Intersects y-axis or x-axis
 (d) None of the above
- (iii) Graph of a quadratic polynomial is a
 (a) straight line
 (b) circle
 (c) parabola
 (d) ellipse (U)
- (iv) The representation of Highway Underpass whose one zero is 6 and sum of the zeroes is 0, is
 (a) $x^2 - 6x + 2$
 (b) $x^2 - 36$
 (c) $x^2 - 6$
 (d) $x^2 - 3$ (Ap)
- (v) The number of zeroes that polynomial $f(x) = (x - 2)^2 + 4$ can have is
 (a) 1 (b) 2
 (c) 0 (d) 3 (2020-21) (Ap)

VSA (1 mark)

9. If the sum of the zeroes of the quadratic polynomial $3x^2 - kx + 6$ is 3, then find the value of k . (2020-21)

SA I (2 marks)

10. Find a quadratic polynomial whose zeroes are $5 - 3\sqrt{2}$ and $5 + 3\sqrt{2}$. (2020-21) (Ap)

SA II (3 marks)

11. If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of the polynomial $2x^2 - 5x - 3$, then find the values of p and q . (2022-23) (Ev)