# GRADE X
# Question Bank (MATHEMATICS)
## Chapter-2 Polynomials

**1 marks:**

1. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2 then the value of k is **[BOARD 2023]**

   a) 10 b) -10 c) 5 d) -5

2. If one zero of the quadratic polynomial $kx^2 + 3x + k$ is 2 then the value of k is

   a) 5/6 b) -5/6 c) 6/5 d) -6/5

3. If one zero of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3 then the value of k is

   a) 4/3 b) -4/3 c) 2/3 d) -2/3

4. If -1 is a zero of the polynomial $kx^2 - 4x + k$, the value of k is

   a) -4 b) -2 c) 2 d) 4

5. If -1 is a zero of the polynomial $x^2 - 7x - 8$ then other zero is,

   a) 4 b) 8 c) 1 d) -4

6. If one zero of the polynomial $3x^2 + 8x + k$ is the reciprocal of the other, then value of k is

   a) 3 b) -3 c) 1/3 d) -1/3

7. If one zero of the polynomial $6x^2 + 37x - (k-2)$ is the reciprocal of the other, then value of k is **[BOARD 2023]**

   a) -4 b) -6 c) 4 d) 6

8. If one zero of the polynomial $x^2 - 3kx + 4k$ be twice the other, then the value of k is **[BOARD 2023]**

   a) -2 b) 2 c) $\frac{1}{2}$ d) $-\frac{1}{2}$

9. If sum of the zeros of the quadratic polynomial $2x^2 - k\sqrt{2}x + 1$ is $\sqrt{2}$ then the value of k is **[BOARD 2024]**

   a) $\sqrt{2}$ b) 2 c) $2\sqrt{2}$ d) $\frac{1}{2}$

10. The sum of zeros of the polynomial $\sqrt{2}x^2 - 17$ are **[BOARD 2023]**

    a) $\frac{17\sqrt{2}}{2}$ b) $-\frac{17\sqrt{2}}{2}$ c) 0 d) 1

11. If the zeros of the quadratic polynomial $x^2 + (a+1)x + b$ are 2 and -3 then

    a) $a = -7, b = -1$ b) $a = 5, b = -1$ c) $a = 2, b = -6$ d) $a = 0, b = -6$

**Prepared by: H.Sabareesh (PGT Mathematics)**

12. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $x^2 - 1$ then the value of $\alpha + \beta$ is

**[BOARD 2023]**

a) 2 b) 1 c) -1 d) 0

13. If $\alpha$ *and* $\beta$ $(\alpha > \beta)$ are the zeros of a polynomial $-x^2 + 8x + 9$ then $(\alpha - \beta)$ is

**[BOARD 2024]**

a) -10 b) 10 c) $\pm 10$ d) 8

14. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$ then p is

**[BOARD 2024]**

a) $-2/3$ b) $2/3$ c) $1/3$ d) $-1/3$

15. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $ax^2 - 5x + c$ and $\alpha + \beta = \alpha\beta = 10$ then

**[BOARD 2023]**

a) $a = 5, c = \frac{1}{2}$ b) $a = 1, c = \frac{5}{2}$ c) $a = \frac{5}{2}, c = 1$ d) $a = \frac{1}{2}, c = 5$

16. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $x^2 - 4\sqrt{3}x + 3$ then the value of $\alpha + \beta - \alpha\beta$ is

a) $\sqrt{3}(2 - \sqrt{3})$ b) $\sqrt{3}(2 + \sqrt{3})$ c) $\sqrt{3}(4 + \sqrt{3})$ d) $\sqrt{3}(4 - \sqrt{3})$

17. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $x^2 + 2x + 1$ then $\frac{1}{\alpha} + \frac{1}{\beta}$ is **[BOARD 2023]**

a) -2 b) 2 c) 0 d) 1

18. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $4x^2 - 3x - 7$ then $\frac{1}{\alpha} + \frac{1}{\beta}$ is **[BOARD 2024]**

a) $\frac{7}{3}$ b) $-\frac{7}{3}$ c) $\frac{3}{7}$ d) $-\frac{3}{7}$

19. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $2x^2 - 13x + 6$, then $\alpha + \beta$ is

a) -3 b) 3 c) $13/2$ d) $-13/2$

20. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $2x^2 - 4x + 5$, the value of $(\alpha - \beta)^2$ is

a) 2 b) 1 c) -1 d) -6

21. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $2x^2 - 4x + 5$, the value of $\alpha^2 + \beta^2$ is

**[BOARD 2023 & BOARD 2024]**

a) -7 b) 1 c) -1 d) -6

22. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $x^2 - ax - b$ then the value of $\alpha^2 + \beta^2$ is

**[BOARD 2023]**

a) $a^2 - 2b$ b) $a^2 + 2b$ c) $b^2 - 2a$ d) $b^2 + 2a$

23. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $2x^2 - 4x + 5$, the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ is

a) $\frac{4}{25}$ b) $-\frac{4}{25}$ c) $\frac{4}{5}$ d) $-\frac{4}{5}$

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24. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $x^2 - x - 4$ then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ is

a) 15/4 b) -15/4 c) 4 d) 15

25. If $p$ *and* $q$ are the zeros of a polynomial $2x^2 - 7x + 3$ the value of $p^2 + q^2$ will be

a) $\frac{39}{5}$ b) $\frac{5}{39}$ c) $\frac{37}{4}$ d) $\frac{4}{37}$

26. If $p$ *and* $q$ are the zeros of a polynomial $2x^2 - 7x + 3$ the value of $p + q - pq$ will be

a) 1 b) 2 c) 3 d) 4

27. If $m$ *and* $n$ are the zeros of a polynomial $3x^2 + 11x - 4$ then the value of $\frac{m}{n} + \frac{n}{m}$ will be

a) $\frac{12}{145}$ b) $-\frac{12}{145}$ c) $-\frac{145}{12}$ d) $\frac{145}{12}$

28. If a and b are the zeros of a polynomial $x^2 + ax + b$, the value of a and b are

a) 1 and 2 b) 1 and -2 c) -2 and 1 d) 2 and 1

29. If the sum of the zeros of the quadratic polynomial $kx^2 + 2x + 3k$ is equal to their product then k

a) 1/3 b) -1/3 c) 2/3 d) -2/3

30. The sum and product of zeros of a quadratic polynomial are $2\sqrt{3}$ and 3 respectively, the quadratic polynomial will be **[BOARD 2024]**

a) $x^2 + 2\sqrt{3}x - 3$ b) $\left(x - \sqrt{3}\right)^2$ c) $x^2 - 2\sqrt{3}x - 3$ d) $x^2 + 2\sqrt{3}x + 3$

31. The quadratic polynomial, the sum of whose zeros is -5 and their product is 6, is

a) $x^2 + 5x + 6$ b) $x^2 - 5x + 6$ c) $x^2 - 5x - 6$ d) $-x^2 + 5x + 6$

32. The quadratic polynomial p(x) with 3 and $-\frac{2}{5}$ as sum and product of its zeros

a) $x^2 - 3x - \frac{2}{5}$ b) $x^2 - 3x - 2$ c) $5x^2 - 15x - 2$ d) $15x^2 - 5x + \frac{2}{5}$

33. The sum and product of the zeros of a quadratic polynomial are 3 and -10 respectively. The quadratic polynomial is

a) $x^2 - 3x + 10$ b) $x^2 + 3x - 10$ c) $x^2 - 3x - 10$ d) $x^2 + 3x + 10$

34. The quadratic polynomial whose sum and product of the zeros are $\frac{21}{8}$ *and* $\frac{5}{16}$, is

a) $16x^2 - 42x + 5$ b) $\frac{1}{16}(16x^2 - 42x + 5)$ c) $\frac{1}{12}(16x^2 + 42x + 5)$ d) $\frac{1}{12}(16x^2 + 42x - 5)$

35. A quadratic polynomial whose zeros are -3 and 4, is

a) $x^2 - 2x + 12$ b) $x^2 + x + 12$ c) $\frac{x^2}{2} - \frac{x}{2} - 6$ d) $2x^2 + 2x - 24$

36. The maximum number of zeros a cubic polynomial can have, is

a) 1 b) 2 c) 3 d) 4

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37. Which of the following is a quadratic polynomial having zeros $-\frac{2}{3}$ *and* $\frac{2}{3}$.

**[BOARD 2023]**

a) $4x^2 - 9$ b) $\frac{4}{9}(9x^2 + 4)$ c) $x^2 + \frac{9}{4}$ d) $5(9x^2 - 4)$

38. Write a quadratic polynomial whose sum of zeros is $-\frac{1}{4}$ and product of zeros is $\frac{1}{4}$

a) $4x^2 + x + 1$ b) $x^2 + 4x - 1$ c) $2x^2 + 3x - 1$ d) $x^2 - 2x + 1$

39. The quadratic polynomial whose zeros are reciprocals of the zeros of the polynomial $ax^2 + bx + c, a \neq 0, c \neq 0$

a) $bx^2 + ax + c$ b) $ax^2 + cx + b$ c) $cx^2 + bx + a$ d) $bx^2 + cx + a$

40. The zeros of the polynomial $x^2 - 2x$ are

a) 2, 4 b) 1, 3 c) 0, 2 d) 0, 4

41. The zeros of the polynomial $x^2 - 3x - m(m + 3)$ are

a) $m, m + 3$ b) $-m, m + 3$ c) $m, -(m + 3)$ d) $-m, -(m + 3)$

42. The zeros of the polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$ are **[BOARD 2023]**

a) $2\sqrt{3}, \sqrt{3}$ b) $2\sqrt{3}, \frac{1}{\sqrt{3}}$ c) $\frac{1}{\sqrt{3}}, \sqrt{3}$ d) $\frac{2}{\sqrt{3}}, 2\sqrt{3}$

43. The zeros of the polynomial $4x^2 - 12x + 9$ will be **[BOARD 2023 & BOARD 2024]**

a) $\frac{3}{2}, \frac{3}{2}$ b) $\frac{2}{3}, \frac{1}{3}$ c) $\frac{3}{2}, \frac{1}{3}$ d) $\frac{1}{3}, \frac{1}{3}$

44. The zeros of polynomial $ax^2 + bx + c$ are reciprocal of each other if

a) $b = 2a$ b) $c = b$ c) $b = a$ d) $c = a$

45. If zeros of the polynomial $x^2 + 4x + 2a$ are $a$ *and* $\frac{2}{a}$ then the value of a is

a) 1 b) 2 c) 3 d) 4

46. If the zeros of the polynomial $x^2 + (a + 1)x + b$ are 2 and -3 then **[BOARD 2023]**

a) $a = -7, b = -1$ b) $a = 5, b = -1$ c) $a = 2, b = -6$ d) $a = 0, b = -6$

47. The zeros of the polynomial $x^2 + px + q$ are twice the zeros of the polynomial $4x^2 - 5x - 6$. The value of p is **[BOARD 2024]**

a) $\frac{-5}{2}$ b) $\frac{5}{2}$ c) -5 d) 10

48. If the square of difference of the zeros of the quadratic polynomial $x^2 + px + 45$ is equal to 144 then the value of p is

a) $\pm 9$ b) $\pm 12$ c) $\pm 15$ d) $\pm 18$

49. The number of polynomials having zeros as -3 and 5 is **[BOARD 2023]**

a) 1 b) 2 c) 3 d) more than 3

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50. What should be the subtracted from the polynomial $x^2 - 16x + 30$ so that 15 is the zero of the resulting polynomial? **[BOARD 2024]**

a) 30 b) 14 c) 15 d) 16

51. What should be the added from the polynomial $x^2 - 5x + 4$ so that 3 is the zero of the resulting polynomial? **[BOARD 2024]**

b) 1 b) 2 c) 4 d) 5

52. If a polynomial p(x) is given by $p(x) = x^2 - 5x + 6$ then the value of $p(1) + p(4)$ is **[BOARD 2024]**

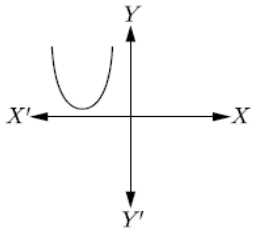
a) 0 b) 4 c) 2 d) -4

53. A quadratic polynomial, one of whose zeros is $2 + \sqrt{5}$ and the sum of whose zeros is 4, is **[BOARD 2024]**

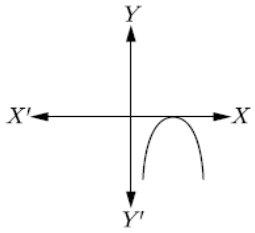
a) $x^2 + 4x - 1$ b) $x^2 - 4x - 1$ c) $x^2 - 4x + 1$ d) $x^2 + 4x + 1$

54. Which of the following is not the graph of a quadratic polynomial?

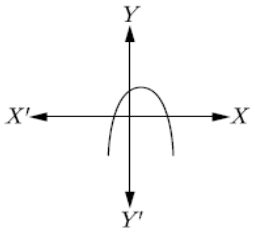
(a)



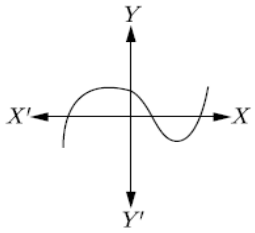

(b)



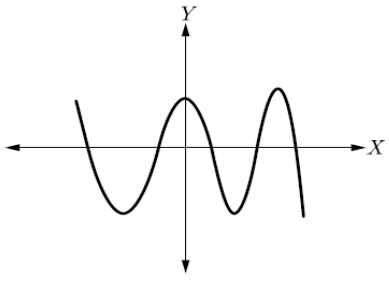

(c)




(d)



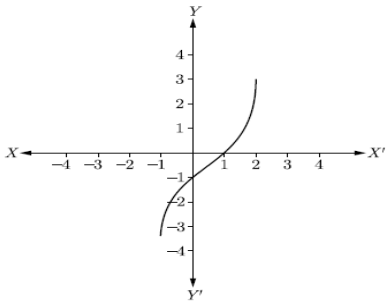

55. The graph of $y = p(x)$ where $p(x)$ is a polynomial in variable x, is as follows:




The number of zeros of p(x) is

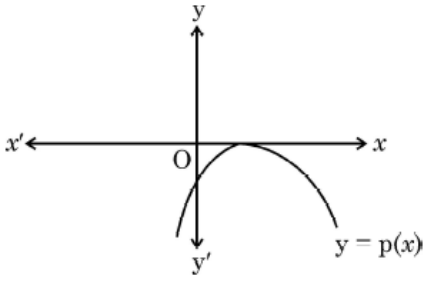
a) 2 b) 3 c) 4 d) 5

56. In the given figure, the graph of a polynomial p(x) is shown. The number of zeros of p(x) will be



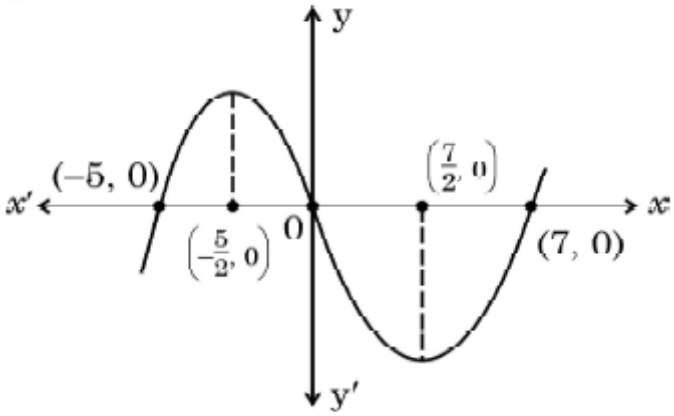

a) 1 b) 2 c) 3 d) 4

57. The graph of $y = p(x)$ is given for a polynomial $p(x)$. The number of zeros of $p(x)$ from the graph is **[BOARD 2023]**




a) 0 b) 1 c) 2 d) 3

58. The graph of $y = p(x)$ is given for a polynomial $p(x)$. The number of zeros of $p(x)$ from the graph are **[BOARD 2023]**




a) -5, 7 b) $-\frac{5}{2}, -\frac{7}{2}$ c) -5, 0, 7 d) $-5, -\frac{5}{2}, \frac{7}{2}, 7$

**Options for Assertion and Reasoning Questions:**

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

59. ***Assertion (A):*** If one zero of the polynomial $(k^2+4)x^2+13x+4k$ is reciprocal of other then $k=2$.

***Reason (R):*** If $(x-\alpha)$ is a factor of $p(x)$ then $p(\alpha)=0$.

60. ***Assertion (A):*** The polynomial $p(x)=x^2+3x+3$ has two real zeros.

***Reason (R):*** A quadratic polynomial can have at most two real zeros.

**[BOARD 2023]**

61. ***Assertion (A):*** If the graph of a polynomial touches x-axis at only one point then the polynomial cannot be a quadratic polynomial. **[BOARD 2024]**

***Reason (R):*** A polynomial of degree $n$ $(n>1)$ can have at most n zeros.

62. ***Assertion (A):*** Degree of zero polynomial is not defined.

***Reason (R):*** Degree of a non-zero constant polynomial is 0. **[BOARD 2024]**

**2 marks:**

1. Find the zeros of the quadratic polynomial $\sqrt{3}x^2-8x+4\sqrt{3}$.
2. Find a quadratic polynomial the sum and product of whose zeros are 6 and 9 respectively. Hence find the zeros.
3. Find a quadratic polynomial the sum and product of whose zeros are -3 and 2 respectively. Hence find the zeros.
4. Form a quadratic polynomial p(x) with 3 and $-\frac{2}{5}$ as sum and product of its zeros respectively.
5. If $\alpha$ *and* $\beta$ are the zeros of the polynomial $5x^2-7x+1$ then find the value of $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$.
6. If $\alpha$ *and* $\beta$ are the zeros of the polynomial $x^2-4\sqrt{3}x+3$, then find the value of $\alpha+\beta-\alpha\beta$. **[BOARD 2024]**
7. If $\alpha$ *and* $\beta$ are the zeros of the polynomial $x^2-(k-6)x+2(2k-1)$ find the value of k if $\alpha+\beta=\frac{1}{2}\alpha\beta$
8. If one of the zeros of the quadratic polynomial $14x^2-42k^2x-9$ is negative of the other, find the value of 'k'.
9. If one zero of the polynomial $2x^2+3x+\lambda$ is $\frac{1}{2}$ find the value of $\lambda$ and the other zero.

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10. Find the value of k such that the polynomial $x^2 - (k+6)x + 2(2k+1)$ has sum of its zeros equal to half of their product.

**3 marks:**

1. Find the zeros of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between zeros and coefficients.
2. Find the zeros of the quadratic polynomial $x^2 + \frac{1}{6}x - 2$ and verify the relationship between zeros and coefficients.
3. Find the zeros of the quadratic polynomial $x^2 - 15$ and verify the relationship between zeros and coefficients. **[BOARD 2024]**
4. Find the zeros of the quadratic polynomial $2x^2 - x - 6$ and verify the relationship between zeros and coefficients. **[BOARD 2024]**
5. If the zeros of the polynomial $x^2 + px + q$ are double in value to the zeros of the polynomial $2x^2 - 5x - 3$ then find the values of p and q.
6. If a, b are the zeros of the polynomial $2x^2 - 5x + 7$ then find a polynomial whose zeros are $2a + 3b \; and \; 3a + 2b$.
7. Find a quadratic polynomial whose zeros are reciprocals of the zeros of the polynomial $ax^2 + bx + c, a \neq 0, c \neq 0$.
8. Find the quadratic polynomial sum and product of whose zeros are -1 and -20 respectively. Also find the zeros of the polynomial so obtained.
9. Verify whether 2, 3 and $1/2$ are the zeros of the polynomial $2x^3 - 11x^2 + 17x - 6$.
10. If the sum and product of the zeroes of the polynomial $ax^2 - 5x + c$ are equal to 10 each, find the value of 'a' and 'c'.
11. If one zero of the polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the value of k.
12. If $\alpha \; and \; \beta$ are the zeros of a polynomial $2x^2 - 3x + 1$ then find the quadratic polynomial whose zeros are $3\alpha \; and \; 3\beta$.
13. If $\alpha \; and \; \beta$ are the zeros of a polynomial $x^2 - 4x - 5$ the find the value of $\alpha^2 + \beta^2$.
14. If $\alpha \; and \; \beta$ are the zeros of a polynomial $x^2 + x - 2$ then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

**[BOARD 2024]**

15. What number should be added to the polynomial $x^2 - 5x + 4$ so that 3 is the zero of the polynomial?

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**5 marks:**

1. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $3x^2 + 2x + 1$ find the polynomial whose zeroes are $\frac{1-\alpha}{1+\alpha}$ and $\frac{1-\beta}{1+\beta}$.
2. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $2x^2 + 5x + k$ satisfying the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$ then find the value of k.
3. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $6x^2 - 5x + k$ such that $\alpha - \beta = \frac{1}{6}$ then find the value of k.
4. If $\beta$ *and* $\frac{1}{\beta}$ are zeros of the polynomial $(a^2 + a)x^2 + 61x + 6a$ find the value of $\alpha$ *and* $\beta$.
5. Find the zeros of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeros and the coefficients.
6. If $\alpha$ *and* $\beta$ are the zeros of a polynomial $2x^2 - 4x + 5$, find the values of
   (i) $\alpha^2 + \beta^2$
   (ii) $\frac{1}{\alpha} + \frac{1}{\beta}$
   (iii) $(\alpha - \beta)^2$
   (iv) $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$
   (v) $\alpha^3 + \beta^3$

**Case Based Questions:**

1. In a pool at an aquarium, a dolphin jumps out of the water travelling at 20 cm per second. Its height above water level after t seconds is given by $h = 20t - 16t^2$.

**[BOARD 2023]**

Based on the above, answer the following questions :

(i) Find zeroes of polynomial $p(t) = 20t - 16t^2$. **1**

(ii) Which of the following types of graph represents p(t)? **1**

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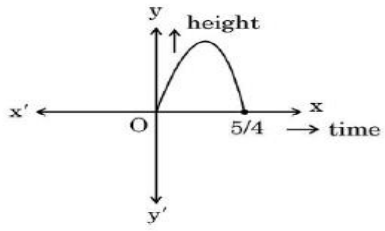
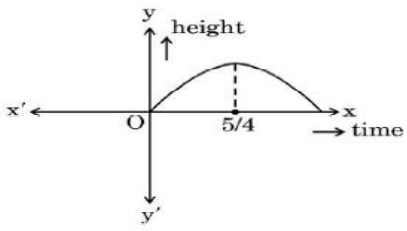
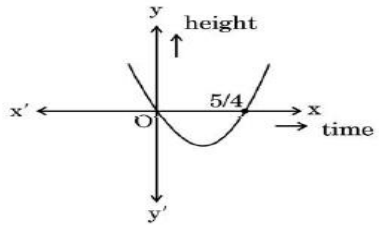
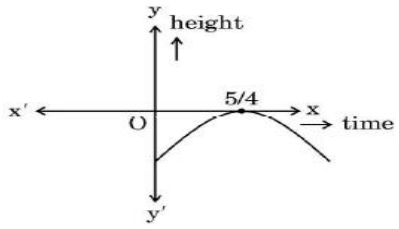
(a) 


(b) 


(c) 

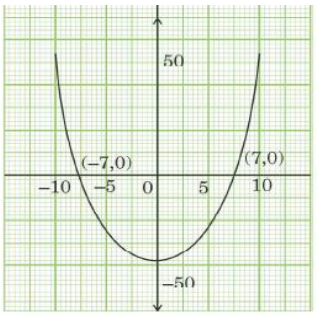

(d) 

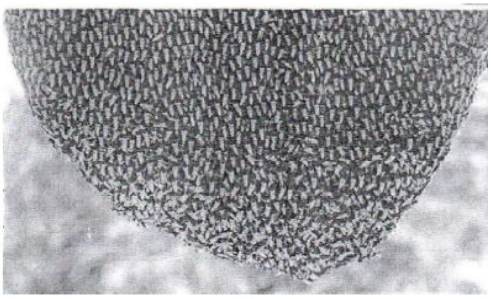

(iii) What would be the value of h at $t = \frac{3}{2}$? Interpret the result. **2**

**OR**

How much distance has the dolphin covered before hitting the water level again? **2**

2. While playing in a garden, Samaira saw a honeycomb and asked her mother what is that. Her mother replied that it's a honeycomb made by honey bees to store honey. Also, she told her that the shape of the honeycomb formed is mathematical structure. The mathematical representation of the honeycomb is shown in the graph. **[BOARD 2023]**



Based on the above information, answer the following questions:

(i) How many zeros are there for the polynomial represented by the graph given? **1**

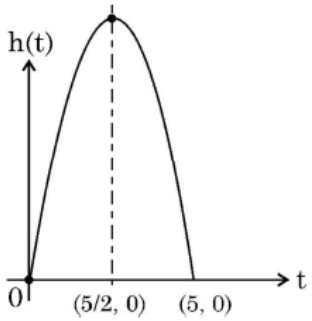
(ii) Write the zeros of the polynomial. **1**

(iii) If the zeros of the polynomial $x^2 + (a+1)x + b$ are 2 and -3 then determine the values of a and b. **2**

**OR**

If the square of the difference of the zeros of the polynomial $x^2 + px + 45$ is 144 then find the values of p. **2**

3. A ball is thrown in the air so that t seconds after it is shown, its height h meter above its starting point is given by the polynomial $h = 25t - 5t^2$. **[BOARD 2024]**




Observe the graph of the polynomial and answer the following questions:

(i) Write zeros of the given polynomial. **1**

(ii) Find the maximum height achieved by the ball. **1**

(iii) After throwing upward, how much time did the ball take to reach to the height of 30 m? **2**

**OR**

Find two different values of t when the height of the ball was 20m. **2**