CBSE

POLYNOMIALS WS 2

Class 10 - Mathematics

Section A

1. Match the column: **[2]**

Sum and product of Zeroes	Quadratic Polynomial
(a) Sum = 6, Product = 7	(i) $x^2 + 5x + 5$
(b) Sum = $-\frac{1}{2}$, Product = $\frac{1}{2}$	(ii) $3x^2 - 7x + 8$
(c) Sum = -5, Product = 5	(iii) $2x + x + 1$
(d) Sum = $\frac{7}{3}$, Product = $\frac{8}{3}$	(iv) $x^2 - 6x + 7$

2. Match the column: **[2]**

Zeroes	Quadratic Polynomial
(a) $5 + \sqrt{3}, 5 - \sqrt{3}$	(i) $x^2 + x - 20$
(b) -5, 4	(ii) $x^2 - 6x + 7$
(c) $\frac{2-\sqrt{2}}{6}, \frac{2+\sqrt{2}}{6}$	(iii) $x^2 - 10x + 22$
(d) $3 + \sqrt{2}, 3 - \sqrt{2}$	(iv) $x^2 - \frac{2}{3}x + \frac{1}{18}$

3. Match the following table: **[2]**

Polynomial	Zeroes
(a) $2x^2 - 8x + 6$	(i) $\frac{1}{3}$, -2
(b) $3x^2 + 5x - 2$	(ii) -2, 4
(c) $x^2 + 7x + 10$	(iii) 1, 3
(d) $x^2 - 2x - 8$	(iv) -2, -5

4. Match the column: **[2]**

(a) If Sum and Product of Polynomial respectively -3, 2, then the polynomial is	(i) $x^2+7x+10$
(b) Sum and Product of Polynomial respectively 0,-15, then the polynomial is	(ii) $3x^2-x-4$
(c) If Sum and Product of Polynomial respectively $\frac{1}{3}, \frac{-4}{3}$, then the polynomial is	(iii) x^2+3x+2
(d) If Sum and Product of Polynomial respectively -7,10, then the polynomial is	(iv) x^2-15

5. Match the following: **[2]**

(a) If α and $\beta(\alpha > \beta)$ are zeros of $x^2- 12x + 35$, then, $\alpha + \beta =$	(i) 74

(b) If α and $\beta(\alpha > \beta)$ are zeros of x^2- 12x + 35, then $\alpha - \beta$ =	(ii) 24
(c) If α and $\beta(\alpha > \beta)$ are zeros of x^2-12x+35, then $\alpha^2 + \beta^2$ =	(iii) 12
(d) If α and $\beta(\alpha > \beta)$ are zeros of x^2- 12x + 35, then $\alpha^2 - \beta^2$ =	(iv) 2

Section B

6. Find the zeroes of the polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ by factorisation method and verify the relationship between the zeroes and coefficient of the polynomial. **[3]**

7. If α and β are the zeros of the quadratic polynomial f(x) = x^2 - 2x + 3, find a polynomial whose roots are $\alpha + 2, \beta + 2$ **[3]**

8. Read the following statement carefully and deduce about the sign of the constants p, q, and r. **[3]**
"The zeroes of a quadratic polynomial $px^2 + qx + r$ are both negatives."

9. If α, β are the zeroes of the x^2 + 7x + 7, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$. **[3]**

10. If the coefficient of x in a quadratic polynomial is zero, then prove that zeros will be equal in magnitude and opposite in sign. **[3]**

11. If α, β are zeroes of the quadratic polynomial x^2 + 9x + 20, form a quadratic polynomial whose zeroes are (α + 1) and (β + 1). **[3]**

12. Find the zeroes of the polynomial $v^2 + 4\sqrt{3}v$ - 15 by factorisation method and verify the relationship between the zeroes and coefficient of the polynomials. **[3]**

13. If α and β are the zeros of the quadratic polynomial f(x) = x^2 - 2x + 3, find a polynomial whose roots are **[3]**
    i. $\alpha + 2, \beta + 2$
    ii. $\frac{\alpha-1}{\alpha+1}, \frac{\beta-1}{\beta+1}$

14. Find the zeroes of the given quadratic polynomials and verify the relationship between the zeroes and their coefficients x^2 - 6. **[3]**

15. One zero of the polynomial x^2- 2x - (7p + 3) is -1, find the value of p and the other zero. **[3]**

16. If α and β are zeroes of the quadratic polynomial $4x^2$ + 4x + 1, then form a quadratic polynomial whose zeroes are 2α and 2β. **[3]**

17. Find the zeroes of quadratic polynomial x^2 - 2x - 8 and verify the relationship between the zeroes and their coefficients. **[3]**

18. Find the zeros of f(x) = x^2 - 2x - 8 and verify the relationship between the zeros and its coefficients. **[3]**

19. Write the family of quadratic polynomials having $-\frac{1}{4}$ and 1 as its zeros. **[3]**

20. If α and β are the zeros of the polynomial f(x) = $6x^2$ + x - 2, find the value of $\left(\frac{\alpha}{\beta} + \frac{\beta}{\alpha}\right)$ **[3]**

21. Find the zeros of p(x) = $x^2 + 2\sqrt{2}x$ - 6 and verify the relationship between the zeros and its coefficients. **[3]**

22. Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{2}$ and $\frac{1}{3}$, respectively. **[3]**

23. Find the zeroes of the polynomial $y^2 + \frac{3}{2}\sqrt{5}y$ - 5 by factorisation method and verify the relationship between the zeroes and coefficient of the polynomials. **[3]**

24. Find the zeros of polynomial p(y) = $y^2 + \frac{3\sqrt{5}}{2}y - 5$ and verify the relationship between the zeros and its coefficients. **[3]**

25. Find a quadratic polynomial whose sum and product of the zeroes are $-2\sqrt{3}, -9$ respectively. Also find the zeroes of the polynomial by factorisation. **[3]**

26. Find the zeroes of the polynomial $2s^2 + (1 + 2\sqrt{2})s + \sqrt{2}$ by factorisation method and verify the relationship between the zeroes and coefficient of the polynomial. **[3]**

27. If α and β are the zeros of the quadratic polynomial $f(x) = ax^2 + bx + c$, then evaluate: $\frac{\beta}{a\alpha+b} + \frac{\alpha}{a\beta+b}$. **[3]**

28. Find a quadratic polynomial, the sum and product of whose zeroes are $\frac{1}{4}$ and -1, respectively. **[3]**

29. Find a quadratic polynomial whose sum and product of the zeroes are $-\frac{21}{8}$ and $\frac{5}{16}$ respectively. Also find the zeroes of the polynomial by factorisation. **[3]**

30. Find the zeroes of the quadratic polynomial $4y^2 - 15$ and verify the relationship between the zeroes and coefficient of polynomial. **[3]**

31. If α and β are the zeroes of the quadratic polynomial $f(x) = ax^2 + bx + c$, then evaluate: $\frac{1}{\alpha} - \frac{1}{\beta}$ **[3]**

32. Find the zeroes of the quadratic polynomial $3x^2 - 2$ and verify the relationship between the zeroes and the coefficients. **[3]**

33. If α, β are zeroes of the quadratic polynomial $x^2 + 3x + 2$, find a quadratic polynomial whose zeroes are $\alpha + 1$, $\beta + 1$. **[3]**

34. Find the quadratic polynomial, sum and product of whose zeroes are -1 and -20 respectively. Also find the zeroes of the polynomial so obtained. **[3]**

35. Find the zeroes of the polynomial $4x^2 + 5\sqrt{2}x - 3$ by factorisation method and verify the relationship between the zeroes and coefficient of the polynomial. **[3]**

36. If one root of the quadratic polynomial $2x^2 - 3x + p$ is 3, find the other root. Also, find the value of p. **[3]**

37. Find the zeroes of the given quadratic polynomials and verify the relationship between the zeroes and the coefficients. $6x^2 - 3 - 7x$ **[3]**

38. Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients of the polynomial. **[3]**

39. If α, β are the zeros of the polynomial $2x^2 - 4x + 5$. find the value of (i) $\alpha^2 + \beta^2$ (ii) $(\alpha - \beta)^2$. **[3]**

40. If one zero of the polynomial $2x^2 + 3x + \lambda$ is $\frac{1}{2}$, find the value of λ and other zero. **[3]**

41. If α and β are the zeros of the polynomial $f(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, find the value of k. **[3]**

42. Find a quadratic polynomial whose sum and product of the zeroes are $\frac{-3}{2\sqrt{5}}, -\frac{1}{2}$ respectively. Also find the zeroes of the polynomial by factorisation. **[3]**

43. 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. **[3]**

Section C

Question No. 44 to 47 are based on the given text. Read the text carefully and answer the questions: **[4]**

The below picture are few natural examples of parabolic shape which is represented by a quadratic polynomial. A parabolic arch is an arch in the shape of a parabola. In structures, their curve represents an efficient method of load, and so can be found in bridges and in architecture in a variety of forms.

44. In the standard form of quadratic polynomial, $ax^2 + bx + c$, what are a, b and c?

45. If the roots of the quadratic polynomial are equal, what is the discriminant D?

46. If α and $\frac{1}{\alpha}$ are the zeroes of the quadratic polynomial are $2x^2 - x + 8k$, then find the value of k?

47. What is the relation between zeros and coefficient for a quadratic polynomial?

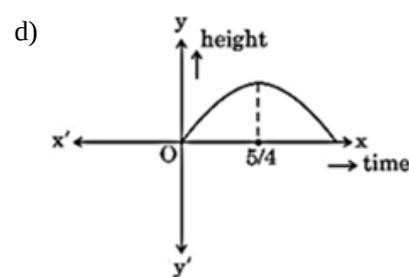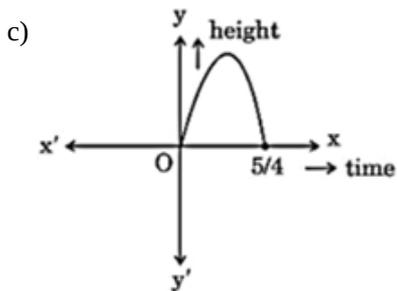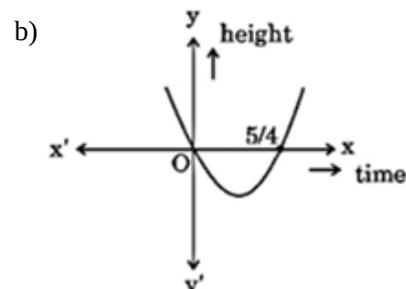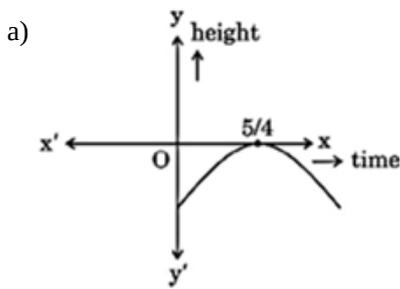**Question No. 48 to 51 are based on the given text. Read the text carefully and answer the questions:** **[4]**

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 $h = 20t - 16t^2$.

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

49. Which of the following types of graph represents p(t)?

a)

b)

c)

d)

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

51. How much distance has the dolphin covered before hitting the water level again?

Question No. 52 to 55 are based on the given text. Read the text carefully and answer the questions: **[4]**

Rachna and her husband Amit who is an architect by profession, visited France. They went to see Mont Blanc Tunnel which is a highway tunnel between France and Italy, under the Mont Blanc Mountain in the Alps, and has a parabolic cross-section. The mathematical representation of the tunnel is shown in the graph.
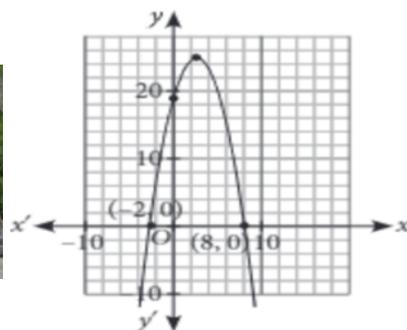
52. What will be the expression of the polynomial given in diagram?

53. What is the value of the polynomial, represented by the graph, when x = 4?

54. If the tunnel is represented by $-x^2 + 3x - 2$. Then what is its zeroes?

55. What is sum of zeros and product of zeros for $-x^2 + 3x - 2$?

Question No. 56 to 59 are based on the given text. Read the text carefully and answer the questions: **[4]**

Rainbow is an arch of colours that is visible in the sky after rain or when water droplets are present in the atmosphere. The colours of the rainbow are generally, red, orange, yellow, green, blue, indigo and violet. Each colour of the rainbow makes a parabola. We know that any quadratic polynomial $p(x) = ax^2 + bx + c$ (a $\neq$ 0) represents a parabola on the graph paper.
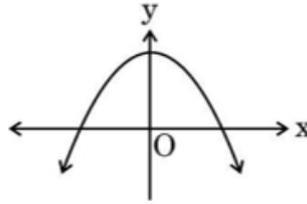
56. The graph of a rainbow y = f(x) is shown in the figure. Write the number of zeroes of the curve.

57. If the graph of a rainbow does not intersect the x-axis but intersects y-axis at one point, then how many zeroes will it have?

58. If a rainbow is represented by the quadratic polynomial $p(x) = x^2 + (a + 1) x + b$, whose zeroes are 2 and -3, find the value of a and b.

59. The polynomial $x^2 - 2x - (7p + 3)$ represents a rainbow. If -4 is a zero of it, find the value of p.

Question No. 60 to 63 are based on the given text. Read the text carefully and answer the questions: **[4]**

An object which is thrown or projected into the air, subject to only the acceleration of gravity is called a projectile, and its path is called its trajectory. This curved path was shown by Galileo to be a parabola. Parabola is represented by a polynomial. If the polynomial to represent the distance covered is,

$p(t) = -5t^2 + 40t + 1.2$

60. What is the degree of the polynomial $p(t) = -5 t^2 + 40t + 1.2$?

61. What is the height of the projectile at the time of 4 seconds after it is launched?

62. What is the name of the polynomial $p(t) = -5t^2 + 40t + 1.2$ that is classified based on its degree?

63. What are the factors of the given quadratic equation $p(x) = x^2 - 5x + 6$?

<p align="center">Section D</p>

64. If α and β are the zeros of the quadratic polynomial $f(x) = ax^2 + bx + c$, then evaluate: **[5]**
$a \left(\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha} \right) + b \left(\frac{\alpha}{\beta} + \frac{\beta}{\alpha} \right)$

65. If α and β are the zeroes of the polynomial $p(x) = 6x^2 + 5x - k$ satisfying the relation, $\alpha - \beta = \frac{1}{6}$, then find the value of k. **[5]**

66. Find the zeros of $f(v) = v^2 + 4\sqrt{3}v - 15$ and verify the relationship between the zeros and its coefficients. **[5]**

67. Find the zeros of $q(y) = 7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeros and its coefficients. **[5]**

68. Obtain the other zeroes of the polynomial $p(x) = x^4 + 2x^3 - 7x^2 - 8x + 12$ if two of its zeroes are (-2) and (-3). **[5]**

69. Without actually calculating the zeroes, form a quadratic polynomial whose zeroes are reciprocals of the zeroes of the polynomial $5x^2 + 2x - 3$. **[5]**

70. If α and β are the zeroes of the polynomial $x^2 + 4x + 3$, find the polynomial whose zeroes are **[5]**

   $1 + \frac{\beta}{\alpha}$ and $1 + \frac{\alpha}{\beta}$. .

71. If β and $\frac{1}{\beta}$ are zeroes of the polynomial $(\alpha^2 + \alpha)x^2 + 61x + 6\alpha$. Find the values of β and α. **[5]**

72. If α and β are the zeroes of polynomial $p(x) = 3x^2 + 2x + 1$, find the polynomial whose zeroes are **[5]**

   $\frac{1-\alpha}{1+\alpha}$ and $\frac{1-\beta}{1+\beta}$.

73. Find the zeros of $f(s) = 2s^2 - (1 + 2\sqrt{2})s + \sqrt{2}$ and verify the relationship between the zeros and its **[5]**

   coefficients.

74. Find the zeroes of a quadratic polynomial $2x^2 + 3x - 14$ and verify the relationship between the zeroes and its **[5]**

   coefficients.

75. If α and β are zeroes of the polynomial $p(x) = 6x^2 - 5x + k$ such that $\alpha - \beta = \frac{1}{6}$, find the value of k. **[5]**