PRACTICE QUESTIONS
CLASS X : CHAPTER - 2
POLYNOMIALS

1. If $p(x) = 3x^3 - 2x^2 + 6x - 5$, find $p(2)$.

2. Draw the graph of the polynomial $f(x) = x^2 - 2x - 8$.

3. Draw the graph of the polynomial $f(x) = 3 - 2x - x^2$.

4. Draw the graph of the polynomial $f(x) = -3x^2 + 2x - 1$.

5. Draw the graph of the polynomial $f(x) = x^2 - 6x + 9$.

6. Draw the graph of the polynomial $f(x) = x^3$.

7. Draw the graph of the polynomial $f(x) = x^3 - 4x$.

8. Draw the graph of the polynomial $f(x) = x^3 - 2x^2$.

9. Draw the graph of the polynomial $f(x) = -4x^2 + 4x - 1$.

10. Draw the graph of the polynomial $f(x) = 2x^2 - 4x + 5$.

11. Find the quadratic polynomial whose zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$.

12. Find the quadratic polynomial whose zeroes are $\frac{3-\sqrt{3}}{5}$ and $\frac{3+\sqrt{3}}{5}$.

13. Find a quadratic polynomial whose sum and product of zeroes are $\sqrt{2}$ and 3 respectively.

14. Find the zeroes of the polynomial $mx^2 + (m + n)x + n$.

15. If m and n are zeroes of the polynomial $3x^2 + 11x - 4$, find the value of $\frac{m}{n} + \frac{n}{m}$

16. If a and b are zeroes of the polynomial $x^2 - x - 6$, then find a quadratic polynomial whose zeroes are $(3a + 2b)$ and $(2a + 3b)$.

17. If p and q are zeroes of the polynomial $t^2 - 4t + 3$, show that $\frac{1}{p} + \frac{1}{q} - 2pq + \frac{14}{3} = 0$.

18. If $(x - 6)$ is a factor of $x^3 + ax^2 + bx - b = 0$ and $a - b = 7$, find the values of a and b.

19. If 2 and -3 are the zeroes of the polynomial $x^2 + (a + 1)x + b$, then find the value of a and b.

20. Obtain all zeroes of polynomial $f(x) = 2x^4 + x^3 - 14x^2 - 19x - 6$ if two of its zeroes are -2 and -1.

21. Find all the zeroes of the polynomial $2x^3 - 4x - x^2 + 2$, if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

22. Find all the zeroes of the polynomial $x^4 - 3x^3 + 6x - 4$, if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

23. Find all the zeroes of the polynomial $2x^4 - 9x^3 + 5x^2 + 3x - 1$, if two of its zeroes are $2 + \sqrt{3}$ and $2 - \sqrt{3}$.

24. Find all the zeroes of the polynomial $2x^4 + 7x^3 - 19x^2 - 14x + 30$, if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

25. Find all the zeroes of the polynomial $x^3 + 3x^2 - 2x - 6$, if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

26. Find all the zeroes of the polynomial $2x^3 - x^2 - 5x - 2$, if two of its zeroes are –1 and 2.

27. Find all the zeroes of the polynomial $x^3 + 3x^2 - 5x - 15$, if two of its zeroes are $\sqrt{5}$ and $-\sqrt{5}$.

28. Find all the zeroes of the polynomial $x^3 - 4x^2 - 3x + 12$, if two of its zeroes are $\sqrt{3}$ and $-\sqrt{3}$.

29. Find all the zeroes of the polynomial $2x^3 + x^2 - 6x - 3$, if two of its zeroes are $\sqrt{3}$ and $-\sqrt{3}$.

30. Find all the zeroes of the polynomial $x^4 + x^3 - 34x^2 - 4x + 120$, if two of its zeroes are 2 and –2.

31. If the polynomial $6x^4 + 8x^3 + 17x^2 + 21x + 7$ is divided by another polynomial $3x^2 + 4x + 1$, the remainder comes out to be (ax + b), find a and b.

32. 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 value of p and q.

33. Find the zeroes of a polynomial $x^3 - 5x^2 - 16x + 80$, if its two zeroes are equal in magnitude but opposite in sign.

34. If two zeroes of the polynomial $x^4 + 3x^3 - 20x^2 - 6x + 36$ are $\sqrt{2}$ and $-\sqrt{2}$, find the other zeroes of the polynomial.

35. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial g(x), the quotient and remainder were x – 2 and –2x + 4 respectively. Find g(x).

36. If the product of zeroes of the polynomial $ax^2 - 6x - 6$ is 4, find the value of 'a'.

37. If one zero of the polynomial $(a^2 + 9)x^2 + 13x + 6a$ is reciprocal of the other. Find the value of a.

38. Write a quadratic polynomial, sum of whose zeroes is $2\sqrt{3}$ and their product is 2.

39. Find a polynomial whose zeroes are 2 and –3.

40. Find the zeroes of the quadratic polynomial $x^2 + 5x + 6$ and verify the relationship between the zeroes and the coefficients.

41. Find the sum and product of zeroes of $p(x) = 2(x^2 - 3) + x$.

42. Find a quadratic polynomial, the sum of whose zeroes is 4 and one zero is 5.

43. Find the zeroes of the polynomial $p(x) = \sqrt{2}x^2 - 3x - 2\sqrt{2}$.

44. If α and β are the zeroes of $2x^2 + 5(x - 2)$, then find the product of α and β.

45. Find a quadratic polynomial, the sum and product of whose zeroes are 5 and 3 respectively.

46. 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.

47. Find the zeroes of the following polynomials by factorisation method and verify the relations between the zeroes and the coefficients of the polynomials:

(i) $4x^2 - 3x - 1$

(ii) $3x^2 + 4x - 4$

(iii) $5t^2 + 12t + 7$

(iv) $t^3 - 2t^2 - 15t$

(v) $2x^2 + \frac{7}{2}x + \frac{3}{4}$

(vi) $4x^2 + 5\sqrt{2}\,x - 3$

(vii) $2s^2 - (1 + 2\sqrt{2}\,)s + \sqrt{2}$

(viii) $v^2 + 4\sqrt{3}\,v - 15$

(ix) $y^2 + \frac{3}{2}\sqrt{5}\,y - 5$

(x) $7y^2 - \frac{11}{3}y - \frac{2}{3}$

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

49. Find the zeroes of the polynomial $x^2 + \frac{1}{6}x - 2$, and verify the relation between the coefficients and the zeroes of the polynomial.

50. Find the zeroes of the quadratic polynomial $x^2 + 5x + 6$ and verify the relationship between the zeroes and the coefficients.

51. Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{2}$ and $-\frac{3}{2}$, respectively. Also find its zeroes.

52. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then find the value of *k*

53. Given that two of the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$ are 0, find the third zero.

54. Given that one of the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$ is zero, then find the product of the other two zeroes.

55. If one of the zeroes of the cubic polynomial $x^3 + ax^2 + bx + c$ is –1, then the product of the other two zeroes

Answer the Questions from 28 to 32 and justify:

56. Can $x^2 - 1$ be the quotient on division of $x^6 + 2x^3 + x - 1$ by a polynomial in *x* of degree 5?

57. What will the quotient and remainder be on division of $ax^2 + bx + c$ by $px^3 + qx^2 + rx + s$, $p \neq 0$?

58. If on division of a polynomial $p(x)$ by a polynomial $g(x)$, the degree of quotient is zero, what is the relation between the degrees of $p(x)$ and $g(x)$?

59. If on division of a non-zero polynomial $p(x)$ by a polynomial $g(x)$, the remainder is zero, what is the relation between the degrees of $p(x)$ and $g(x)$?

60. Can the quadratic polynomial $x^2 + kx + k$ have equal zeroes for some odd integer $k > 1$?

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

62. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3, then find the value of a and b.

63. If α and β are zeroes of the quadratic polynomial $x^2 - (k + 6)x + 2(2k - 1)$. Find the value of k if $\alpha + \beta = \frac{1}{2}\alpha\beta$.

64. Obtain all the zeroes of $3x^4 + 6x^3 - 2x^2 - 10x + 5$, if two of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

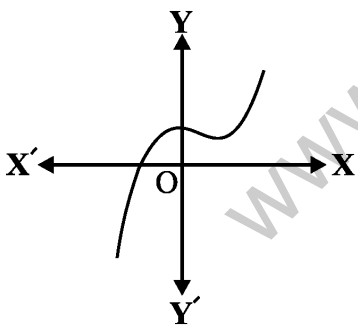
65. Obtain all the zeroes of $x^4 - 7x^3 + 17x^2 - 17x + 6$, if two of its zeroes are 3 and 1.

66. Obtain all the zeroes of $x^4 - 7x^2 + 12$, if two of its zeroes are $\sqrt{3}$ and $-\sqrt{3}$.

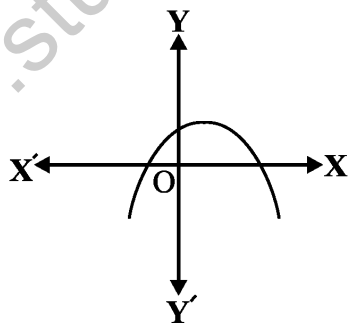
67. Two zeroes of the cubic polynomial $ax^3 + 3x^2 - bx - 6$ are -1 and -2. Find the 3rd zero and value of a and b.

68. α, β and γ are the zeroes of cubic polynomial $x^3 + px^2 + qx + 2$ such that $\alpha . \beta + 1 = 0$. Find the value of $2p + q + 5$.

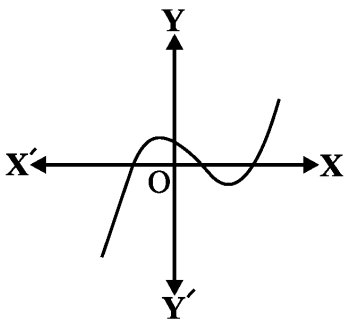
69. Find the number of zeroes in each of the following:



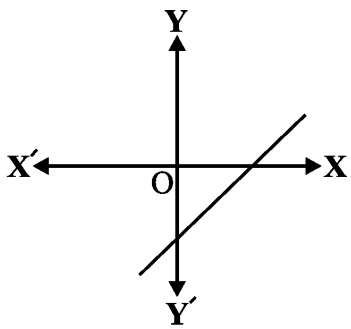
(i)



(ii)



(iii)



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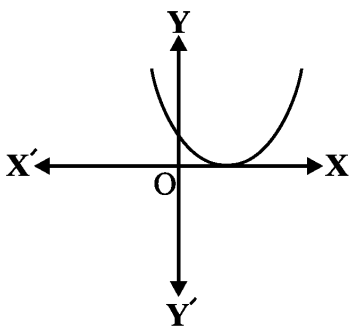
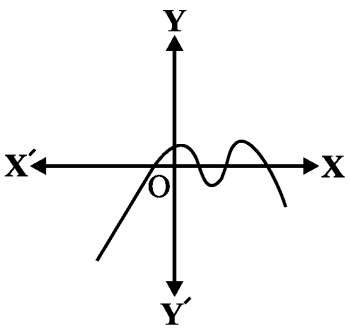


(v)



(vi)

70. If the remainder on division of $x^3 + 2x^2 + kx + 3$ by $x - 3$ is 21, find the quotient and the value of k. Hence, find the zeroes of the cubic polynomial $x^3 + 2x^2 + kx - 18$.

71. 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.

72. Find the zeroes of the polynomial $f(x) = x^3 - 5x^2 - 2x + 24$, if it is given that the product of two zeroes is 12.

73. Find the zeroes of the polynomial $f(x) = x^3 - px^2 + qx - r$, if it is given that the sum of two zeroes is zero.

74. If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $a - b$, a, $a + b$, find a and b.

75. If the zeroes of the polynomial $2x^3 - 15x^2 + 37x - 30$ are $a - b$, a, $a + b$, find all the zeroes.

76. If the zeroes of the polynomial $x^3 - 12x^2 + 39x - 28$ are $a - b$, a, $a + b$, find all the zeroes.

77. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be $x + a$, find k and a.

78. If the polynomial $6x^4 + 8x^3 - 5x^2 + ax + b$ is exactly divisible by the polynomial $2x^2 - 5$, then find the values of a and b.

79. Find a cubic polynomial with the sum, sum of the product of its zeroes taken two at a time, and the product of its zeroes as 2, –7, –14 respectively.

80. Find a cubic polynomial with the sum, sum of the product of its zeroes taken two at a time, and the product of its zeroes as 3, –1, –3 respectively.

81. Find a cubic polynomial whose zeroes are 3, $\frac{1}{2}$ and –1.

82. Find a cubic polynomial whose zeroes are –2, –3 and –1.

83. Find a cubic polynomial whose zeroes are 3, 5 and –2.

84. Verify that 5, –2 and $\frac{1}{3}$ are the zeroes of the cubic polynomial $p(x) = 3x^3 - 10x^2 - 27x + 10$ and verify the relation between its zeroes and coefficients.

85. Verify that 3, –2 and 1 are the zeroes of the cubic polynomial $p(x) = x^3 - 2x^2 - 5x + 6$ and verify the relation between its zeroes and coefficients.

86. Verify that the numbers given alongside of the cubic polynomials below are their zeroes. Also verify the relationship between the zeroes and the coefficients in each case:

(i) $2x^3 + x^2 - 5x + 2$; $\frac{1}{2}$, 1, – 2 (ii) $x^3 - 4x^2 + 5x - 2$; 2, 1, 1

87. Find the quotient and remainder when $4x^3 + 2x^2 + 5x - 6$ is divided by $2x^2 + 3x + 1$.

88. On dividing $x^4 - 5x + 6$ by a polynomial $g(x)$, the quotient and remainder were $-x^2 - 2$ and $-5x + 10$ respectively. Find $g(x)$.

89. Given that $\sqrt{2}$ is a zero of the cubic polynomial $6x^3 + \sqrt{2}\,x^2 - 10x - 4\sqrt{2}$, find its other two zeroes.

90. Given that the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are of the form a, $a + b$, $a + 2b$ for some real numbers a and b, find the values of a and b as well as the zeroes of the given polynomial.

91. For which values of a and b, are the zeroes of $q(x) = x^3 + 2x^2 + a$ also the zeroes of the polynomial $p(x) = x^5 - x^4 - 4x^3 + 3x^2 + 3x + b$? Which zeroes of $p(x)$ are not the zeroes of $q(x)$?

92. Find k so that $x^2 + 2x + k$ is a factor of $2x^4 + x^3 - 14x^2 + 5x + 6$. Also find all the zeroes of the two polynomials.

93. Given that $x - \sqrt{5}$ is a factor of the cubic polynomial $x^3 - 3\sqrt{5}x + 13x - 3\sqrt{5}$, find all the zeroes of the polynomial.

94. For each of the following, find a quadratic polynomial whose sum and product respectively of the zeroes are as given. Also find the zeroes of these polynomials by factorisation.

$(i)\ \frac{-8}{3}, \frac{4}{3}$ $(ii)\ \frac{21}{8}, \frac{5}{16}$

$(iii)\ -2\sqrt{3}, -9$ $(iv)\ \frac{-3}{2\sqrt{5}}, -\frac{1}{2}$

95. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - 3x - 2$, then find a quadratic polynomial whose zeroes are $\frac{1}{2\alpha+\beta}$ and $\frac{1}{2\beta+\alpha}$.

96. If α and β are the zeroes of the quadratic polynomial $f(x) = 2x^2 - 5x + 7$, then find a quadratic polynomial whose zeroes are $2\alpha+3\beta$ and $2\beta+3\alpha$.

97. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - 1$, then find a quadratic polynomial whose zeroes are $\frac{2\alpha}{\beta}$ and $\frac{2\beta}{\alpha}$.

98. If α and β are the zeroes of the quadratic polynomial $f(x) = 6x^2 + x - 2$, then find the value of

$(i)\ \alpha-\beta$ $(ii)\ \alpha^2+\beta^2$ $(iii)\ \alpha^4+\beta^4$ $(iv)\ \alpha\beta^2+\alpha^2\beta$

$(v)\ \frac{1}{\alpha}+\frac{1}{\beta}$ $(vi)\ \frac{1}{\alpha}+\frac{1}{\beta}-\alpha\beta$ $(vii)\ \frac{1}{\alpha}-\frac{1}{\beta}$ $(viii)\ \alpha^3+\beta^3$

$(ix)\ \frac{\alpha}{\beta}+\frac{\beta}{\alpha}$ $(x)\ \frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}$ $(xi)\ \frac{\alpha}{\beta}+\frac{\beta}{\alpha}+2\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)+3\alpha\beta$

$(xii)\ \alpha^4\beta^3+\alpha^3\beta^4$ $(xiii)\ \frac{1}{\alpha}+\frac{1}{\beta}-2\alpha\beta$ $(xiv)\ \frac{\alpha^2}{\beta^2}+\frac{\beta^2}{\alpha^2}$

99. If α and β are the zeroes of the quadratic polynomial $f(x) = 4x^2 - 5x - 1$, then find the value of

$(i)\ \alpha-\beta$ $(ii)\ \alpha^2+\beta^2$ $(iii)\ \alpha^4+\beta^4$ $(iv)\ \alpha\beta^2+\alpha^2\beta$

$(v)\ \frac{1}{\alpha}+\frac{1}{\beta}$ $(vi)\ \frac{1}{\alpha}+\frac{1}{\beta}-\alpha\beta$ $(vii)\ \frac{1}{\alpha}-\frac{1}{\beta}$ $(viii)\ \alpha^3+\beta^3$

$(ix)\ \frac{\alpha}{\beta}+\frac{\beta}{\alpha}$ $(x)\ \frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}$ $(xi)\ \frac{\alpha}{\beta}+\frac{\beta}{\alpha}+2\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)+3\alpha\beta$

$(xii)\ \alpha^4\beta^3+\alpha^3\beta^4$ $(xiii)\ \frac{1}{\alpha}+\frac{1}{\beta}-2\alpha\beta$ $(xiv)\ \frac{\alpha^2}{\beta^2}+\frac{\beta^2}{\alpha^2}$

100. If α and β are the zeroes of the quadratic polynomial f(x) = x^2 + x – 2, then find the value of

(i) $\alpha - \beta$ (ii) $\alpha^2 + \beta^2$ (iii) $\alpha^4 + \beta^4$ (iv) $\alpha\beta^2 + \alpha^2\beta$

(v) $\frac{1}{\alpha} + \frac{1}{\beta}$ (vi) $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ (vii) $\frac{1}{\alpha} - \frac{1}{\beta}$ (viii) $\alpha^3 + \beta^3$

(ix) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ (x) $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ (xi) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 2\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) + 3\alpha\beta$

(xii) $\alpha^4\beta^3 + \alpha^3\beta^4$ (xiii) $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$ (xiv) $\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2}$

101. If α and β are the zeroes of the quadratic polynomial f(x) = x^2 – 5x + 4, then find the value of

(i) $\alpha - \beta$ (ii) $\alpha^2 + \beta^2$ (iii) $\alpha^4 + \beta^4$ (iv) $\alpha\beta^2 + \alpha^2\beta$

(v) $\frac{1}{\alpha} + \frac{1}{\beta}$ (vi) $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ (vii) $\frac{1}{\alpha} - \frac{1}{\beta}$ (viii) $\alpha^3 + \beta^3$

(ix) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ (x) $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ (xi) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 2\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) + 3\alpha\beta$

(xii) $\alpha^4\beta^3 + \alpha^3\beta^4$ (xiii) $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$ (xiv) $\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2}$

102. If α and β are the zeroes of the quadratic polynomial f(x) = x^2 – 2x + 3, then find a quadratic polynomial whose zeroes are $\alpha + 2$ and $\beta + 2$

103. If α and β are the zeroes of the quadratic polynomial f(x) = $3x^2$ – 4x + 1, then find a quadratic polynomial whose zeroes are $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$.

104. If α and β are the zeroes of the quadratic polynomial f(x) = x^2 – 2x + 3, then find a quadratic polynomial whose zeroes are $\frac{\alpha - 1}{\alpha + 1}$ and $\frac{\beta - 1}{\beta + 1}$.

105. If α and β are the zeroes of the quadratic polynomial f(x) = x^2 – p(x + 1) – c, show that $(\alpha + 1)(\beta + 1) = 1 - c$.

106. If α and β are the zeroes of the quadratic polynomial such that $\alpha + \beta = 24$ and $\alpha - \beta = 8$, find a quadratic polynomial having α and β as its zeroes.

107. If sum of the squares of zeroes of the quadratic polynomial f(x) = x^2 – 8x + k is 40, find the value of k.

108. If α and β are the zeroes of the quadratic polynomial f(x) = kx^2 + 4x + 4 such that $\alpha^2 + \beta^2 = 24$, find the value of k.

109. If α and β are the zeroes of the quadratic polynomial f(x) = $2x^2$ + 5x + k such that $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, find the value of k.

110. What must be subtracted from $8x^4$ + $14x^3$ – $2x^2$ + 7x – 8 so that the resulting polynomial is exactly divisible by $4x^2$ + 3x – 2.

111. What must be subtracted from $4x^4$ + $2x^3$ – $2x^2$ + x – 1 so that the resulting polynomial is exactly divisible by x^2 + 2x – 3.

112. Find all the zeroes of the polynomial $x^4 - 6x^3 - 26x^2 + 138x - 35$, if two of its zeroes are $2+\sqrt{3}$ and $2-\sqrt{3}$.

113. Find the values of a and b so that $x^4 + x^3 + 8x^2 + ax + b$ is divisible by $x^2 + 1$.

114. If the polynomial $f(x) = x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be $x + a$, find k and a.

115. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - 2x - 8$, then find the value of

(i) $\alpha - \beta$ $(ii)\alpha^2 + \beta^2$ $(iii)\alpha^4 + \beta^4$ $(iv)\alpha\beta^2 + \alpha^2\beta$

$(v)\frac{1}{\alpha} + \frac{1}{\beta}$ $(vi)\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ $(vii)\frac{1}{\alpha} - \frac{1}{\beta}$ $(viii)\alpha^3 + \beta^3$

$(ix)\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ $(x)\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ $(xi)\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 2\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) + 3\alpha\beta$

$(xii)\alpha^4\beta^3 + \alpha^3\beta^4$ $(xiii)\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$ $(xiv)\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2}$