Date: 29/9/2021

Q1. A quadratic equation with integral coefficient has integral roots. Justify your answer.

Q2. Does there exist a quadratic equation whose coefficients are rational but both of its roots are irrational? Justify your answer.

Q3. Does there exist a quadratic equation whose coefficients are all distinct irrationals but both the roots are rationals? Justify your answer.

Q4. Is 0.2 a root of the equation $x^2 - 0.4 = 0$? Justify your answer.

Q5. If $b = 0$, $c < 0$, is it true that the roots of $x^2 + bx + c = 0$ are numerically equal and opposite in sign? Justify your answer.

Q6. State whether the following quadratic equation have two distinct real roots. Justify your answer.
$$x^2 - 3x + 4 = 0$$

Q7. State whether the following quadratic equation have two distinct real roots. Justify your answer.
$$2x^2 + x - 1 = 0$$

Q8. State whether the following quadratic equation have two distinct real roots. Justify your answer.
$$2x^2 - 6x + \frac{9}{2} = 0$$

Q9. State whether the following quadratic equation have two distinct real roots. Justify your answer.
$$3x^2 - 4x + 1 = 0$$

Q10. State whether the following quadratic equation have two distinct real roots. Justify your answer.
$$(x + 4)^2 - 8x = 0$$

Q11. State whether the following quadratic equation have two distinct real roots. Justify your answer.
$$x(1 - x) - 2 = 0$$

Q12. Write whether the following statements are true or false. Justify your answers.
   (i)   Every quadratic equation has atleast two real root.
   (ii)   Every quadratic equation has almost two roots.

Q13. State whether the following quadratic equation have two distinct real roots. Justify your answer.
$$(x + 1)(x - 2) + x = 0$$

Q14. State whether the following quadratic equation have two distinct real roots. Justify your answer.
$$(x - 1)(x + 2) + 2 = 0$$

Q15. Write whether the following statements are true or false. Justify your answers.
   (i)   Every quadratic equation has exactly one root.
   (ii)   Every quadratic equation has atleast one real root.

Q16. Write whether the following statements are true or false. Justify your answers.

    (i)   If the coefficient of x^2 and the constant term of a quadratic equation have opposite signs, then the quadratic equation has real roots.

    (ii)   If the coefficient of x^2 and the constant term have the same sign and if the coefficient of x term is zero, then the quadratic equation has no real roots.

Q17. Find the roots of the quadratic equation by using the quadratic formula in the following:

$$2x^2 - 3x - 5 = 0$$

Q18. Find the roots of the quadratic equation by using the quadratic formula in the following:

$$5x^2 + 13x + 8 = 0$$

Q19. Find the roots of the quadratic equation by using the quadratic formula in the following:

$$-x^2 + 7x - 10 = 0$$

Q20. Find the roots of the quadratic equation by using the quadratic formula in the following:

$$-3x^2 + 5x + 12 = 0$$

Q21. State whether the following quadratic equation have two distinct real roots. Justify your answer.

$$\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + \frac{1}{\sqrt{2}} = 0$$

Q22. Find a natural number whose square diminished by 84 is equal to thrice of 8 more than the given number.

Q23. State whether the following quadratic equation have two distinct real roots. Justify your answer.

$$(x - \sqrt{2})^2 - \sqrt{2}(x + 1) = 0$$

Q24. Find the roots of the quadratic equation by the factorisation method: $3\sqrt{2}x^2 - 5x - \sqrt{2} = 0$

Q25. Find the roots of the quadratic equation by the factorisation method: $\frac{2}{5}x^2 - x - \frac{3}{5} = 0$

Q26. Find the roots of the quadratic equation by the factorisation method: $2x^2 + \frac{5}{3}x - 2 = 0$

Q27. Find the roots of the quadratic equation by using the quadratic formula in the following:

$$\frac{1}{2}x^2 - \sqrt{11}x + 1 = 0$$

Q28. Find the roots of the quadratic equation by using the quadratic formula in the following:

$$x^2 - 3\sqrt{5}x + 10 = 0$$

Q29. Find the roots of the quadratic equation by using the quadratic formula in the following:

$$x^2 + 2\sqrt{2}x - 6 = 0$$

Q30. Find whether the following equation have real roots. If real roots exist, find them

$$x^2 + 5\sqrt{5}x - 70 = 0$$

Q31. Find the roots of the quadratic equation by the factorisation method: $21x^2 - 2x + \frac{1}{21} = 0$

Q32. Find the roots of the quadratic equation by the factorisation method: $3x^2 + 5\sqrt{5}x - 10 = 0$

Q33. Find whether the following equation have real roots. If real roots exist, find them

$$-2x^2 + 3x + 2 = 0$$

Q34. Find whether the following equation have real roots. If real roots exist, find them

$$8x^2 + 2x - 3 = 0$$

Q35. A train, travelling at a uniform speed for 360 km, would have taken 48 min less to travel the same distance, if its speed were 5 km/h more. Find the original speed of the train.

Q36. If Zeba were younger by 5 year than what she really is, then the square of her age (in years) would have been 11 more than five times her actual age, what is her age now?

Q37. A natural number, when increased by 12, equal 160 times its reciprocal. Find the number.

Q38. Find whether the following equation have real roots. If real roots exist, find them

$$\frac{1}{2x - 3} + \frac{1}{x - 5} = 1, \quad x \neq \frac{3}{2}, \ 5$$

Q39. Find whether the following equation have real roots. If real roots exist, find them

$$5x^2 - 2x - 10 = 0$$

Q40. At t min past 2 pm, the time needed by the minute hand of a clock to show 3 pm was found to be 3 min less than $\dfrac{t^2}{4}$ min. Find t.

Q41. At present Asha's age (in years) is 2 more than the square of her daughter Nisha's age. When Nisha grows to her mother's present age. Asha's age would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.

Q42. In the centre of a rectangular lawn of dimensions 50 m × 40 m, a rectangular pond has to be constructed, so that the area of the grass surrounding the pond would be 1184 m^2 (see figure). Find the length and breadth of the pond.
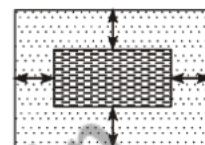
S1. No, consider the quadratic equation $2x^2 + x - 6 = 0$ with integral coefficient. The roots of the given quadratic equation are -2 and $3/2$ which are not integers.

S2. Yes, consider the quadratic equation $2x^2 + x - 9 = 0$ with rational coefficient. The roots of the given quadratic equations are $\dfrac{-1 + \sqrt{33}}{4}$ and $\dfrac{-1 - \sqrt{33}}{4}$ are irrational.

S3. Yes, consider the quadratic equation with all distinct irrational coefficients *i.e.*, $\sqrt{3}x^2 - 7\sqrt{3}x + 12\sqrt{3} = 0$. The roots of this quadratic equation are 3 and 4, which are rational.

S4. No, since 0.2 does not satisfy the quadratic equation *i.e.*, $(0.2)^2 - 0.4 = 0.04 - 0.4 \neq 0$.

S5. Yes, the roots of $x^2 + bx + 1$ are numerically equal and opp. in sign.

S6. No real roots.

S7. Two distinct real roots.

S8. Two distinct real roots.

S9. Two distinct real roots.

S10. No real roots.

S11. No real roots.

S12. (i)　F　　　　(ii)　T

S13. Two distinct real roots.

S14. Two distinct real roots.

S15. (i)　F　　　　(ii)　F

S16. (i)　T　　　　(ii)　T

S17. 5/2 and -1 are the roots of the given equation.

S18. -1 and $-8/5$ are two roots of the given equation.

S19. 2 and 5 are two roots of the given equation.

S20. $-4/3$ and 3 are two roots of the given equation.

S21. Two distinct real roots.

S22. The required natural no. is 12.

S23. Two distinct real roots.

S24. The roots of the equation $3\sqrt{2}\,x^2 - 5x - \sqrt{2} = 0$ and $-\sqrt{2}/6$ and $\sqrt{2}$.

S25. The roots of the equation $2x^2 - 5x - 3 = 0$ and $-1/2$ and 3.

S26. The roots of the equation $6x^2 + 5x - 6 = 0$ and $-3/2$ and $2/3$.

S27. $3 + \sqrt{11}$ and $\sqrt{11} - 3$ are the roots of the given equation.

S28. $2\sqrt{5}$ and $\sqrt{5}$ are the roots of the given equation.

S29. $\sqrt{2}$ and $-3\sqrt{2}$ are the roots of the given equation.

S30. $2\sqrt{5}$, $-7\sqrt{5}$

S31. The roots of the equation $441x^2 - 42x - 1 = 0$ and $1/21$ and $1/21$.

S32. The roots of the equation $3x^2 + 5\sqrt{5}x - 10 = 0$ and $-2\sqrt{5}$ and $\sqrt{5}/3$.

S33. $\dfrac{-1}{2}$, 2

S34. $\dfrac{1}{2}$, $\dfrac{-3}{4}$

S35. The original speed of the train = 45 km/h.

S36. Zeba's age now is 14 years.

S37. The required natural no. is 8.

S38. $\dfrac{9+\sqrt{15}}{2}$, $\dfrac{9-\sqrt{15}}{2}$

S39. $\dfrac{1+\sqrt{51}}{5}$, $\dfrac{1-\sqrt{51}}{5}$

S40. $t = 14$ min.

S41. Present age of Asha is 27 year and Nisha is 5 year

S42. The length and breadth of pond are 34 m and 24 m respectively.