Polynomial and Rational Equations

No Work ⇔ No Points

Use Pencil Only ⇔ Be Neat & Organized

Instructions:

• Solve by using the Zero–Factor Property.
• Express your final answer using solution set.

1. \((x + 7)(x - 5) = 0\)
2. \((2x + 9)(3x - 5) = 0\)
3. \(4x(5x - 8) = 0\)
4. \(-5x(7x + 10) = 0\)
5. \((x - 4)(x + 4)(2x + 11) = 0\)
6. \((2x - 5)(2x + 5)(4x - 7)(4x + 7) = 0\)

Instructions:

• Write the equation in standard form.
• Factor completely.
• Solve by using the Zero–Factor Property.
• Express your final answer using solution set.

7. \(x^2 - 2x - 15 = 0\)
8. \(x^2 - 13x + 36 = 0\)
9. \(x^2 + 8x = -15\)
10. \(x^2 + 100 = 20x\)
11. \(3x^2 = 5 - 2x\)
12. \(4x^2 = 5x + 6\)
13. \(3x^2 + 2 = 7x\)
14. \(x^3 - 5x^2 - 4x + 20 = 0\)
15. \(4x^2 + 1 = -4x\)
16. \(10x^3 = 13x^2 + 3x\)
17. \(16x^2 = 25\)
18. \(2x^3 = 98x\)
Instructions:
• Use FOIL or other methods to multiply in order to write the equation in standard form.
• Factor completely.
• Solve by using the Zero–Factor Property.
• Express your final answer using solution set.

19. \((x + 3)(x + 2) = 20\)
20. \((3x - 1)(x + 1) = 7\)
21. \((3x - 2)(3x + 2) = 5\)

Instructions:
• Write the equation in standard form \(ax^2 + bx + c = 0\).
• Identify \(a\), \(b\), and \(c\).
• Compute \(b^2 - 4ac\).
• Use the quadratic formula \(x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\) to solve.
• Express your final answer using solution set.

22. \((x - 1)^2 + x^2 = (x + 1)^2\)
23. \(x^2 + (x - 2)^2 = (x + 2)^2\)
24. \(x^2 + (2x + 2)^2 = (2x + 3)^2\)

25. \(x^2 + 12x - 13 = 0\)
26. \(2x^2 - 5 = 3x\)
27. \(2x^2 - 7x = 30\)
28. \(2x^2 + 5x = 12\)
29. \(9x^2 + 4 = 12x\)

30. \(x^2 - 10x = -25\)
31. \(x^2 + 36 = -12x\)
32. \((3x - 2)(2x - 3) = -1\)
33. \(0.6x - 0.4x^2 + 1 = 0\)
34. \(\frac{1}{4}x + \frac{1}{2}x^2 = \frac{3}{2}\)
35. The product of two consecutive integers is 30. Use the quadratic formula in the process to find both integers.

36. The product of two consecutive odd integers is 63. Use the quadratic formula in the process to find both integers.

37. The product of two consecutive even integers is 80. Use the quadratic formula in the process to find both integers.

38. The area of a rectangle is 66 square feet. The length is 1 foot shorter than twice its width. Use the quadratic formula in the process to find the dimensions of this rectangle.

39. The area of a rectangle is 44 square feet. The length is 3 feet longer than twice its width. Use the quadratic formula in the process to find the dimensions of this rectangle.

40. Two legs of a right triangle are two consecutive even integers. The hypotenuse is 10 inches. Use the quadratic formula in the process to find the measure of both missing legs.

Instructions:

- Find the LCD and all excluded values.
- Multiply everything by the LCD to clear all fractions.
- Use any method to solve the new equation.
- Express your final answer using solution set.
41. \( x - 5 = \frac{6}{x} \)

42. \( 2 + \frac{5}{x} = \frac{12}{x^2} \)

43. \( 6 + \frac{5}{x} - \frac{6}{x^2} = 0 \)

44. \( \frac{3}{x + 4} + \frac{1}{x - 1} = \frac{5}{x^2 + 3x - 4} \)

45. \( \frac{4}{x - 7} - \frac{2}{x + 7} = \frac{28}{x^2 - 49} \)

46. \( \frac{x}{x - 5} - \frac{2}{x + 3} = \frac{20}{x^2 - 2x - 15} \)

47. \( \frac{2x - 3}{4} = \frac{4}{2x + 3} \)

48. \( \frac{x - 1}{x + 4} - \frac{x + 1}{x - 6} = \frac{2}{x^2 - 2x - 24} \)

49. \( \frac{1}{x} + \frac{1}{x + 1} = \frac{5}{6} \)

50. \( \frac{3}{x} - \frac{1}{x + 2} = \frac{5}{2} \)

51. \( \frac{3}{x} - \frac{1}{x + 2} = \frac{5}{2} \)

52. The sum of a number and its reciprocal is equal to \( \frac{13}{6} \). Find all such numbers.

53. The sum the reciprocal of two consecutive integers is \( \frac{7}{12} \). Find all such integers.

54. The difference of the reciprocal of two consecutive odd integers is \( \frac{2}{15} \). Find all such integers.

55. John can paint a room three times as fast as Mary. Together, they can paint the same room in 1.5 hours. How long does it take each one working alone to paint that room?

56. It takes pipe A 2 hours longer than pipe B to fill up an empty pool. Using both pipes, it takes 2.4 hours to fill up the same pool. How long does it take each pipe, working alone to fill up the pool?

57. Gina drove 195 miles in the same time that Lyn drove 165 miles. Find Gina’s speed if she was driving 10 miles per hour faster than Lyn?
58. Jonathan drove 160 miles in the same time that Alicia drove 100 miles. Find Jonathan’s speed if he was driving 10 miles per hour slower than twice Alicia’s speed?

59. Mr. Castro drove 30 miles in the construction zone, and 120 miles on the highway. The total time for his trip was 3 hours, Find his speed on the highway if he was driving 30 miles per hour faster on the highway.