The Weekly Rigor

39 Problems in Solving Equations
(Part 2)

ANSWERS

1. $x = -6$ or $x = \frac{-3}{2}$	2. $x = 0$ or $x = 3$
3. $x = -2$ or $x = \frac{-4}{3}$	4. $n = 0$
5. $x = 0$ or $x = \frac{1}{3}$ or $x = 1$	6. $x = \frac{2}{3}$ or $\sqrt{2}$ or $-\sqrt{2}$
7. $\theta = -5$ or $\theta = 5$	8. $\alpha = -3$ or $\alpha = -7$
9. $a = 3$ or $a = -3$	10. $x = 1$ or $x = 3$
11. $x = 5$ or $x = -5$	12. $x = \frac{-4}{3}$ or $x = -2$
13. $x = -2$ or $x = 2$ or $x = \frac{-3}{5}$	14. $x = 0$ or $x = \frac{-2}{3}$ or $x = 1$
15. $x = 0$ or $x = 1$	16. $t = \frac{-3}{5}$ or $t = -4$
17. $x = 0$ or $x = -1$	18. $x = \frac{-7}{2}$
19. $x = 0$ or $x = -4$ or $x = 4$	20. $t = 0$ or $t = -1$ or $t = 1$
21. $x = 0$ or $x = -3$ or $x = \frac{1}{2}$	22. $x = 2$
23. $x = 4.5$ or $x = -4.5$	24. $x = 0$ or $x = \frac{-5}{3}$
25. $x = -1$ or $x = 1$ or $x = \frac{-5}{3}$	26. $x = 3$ or $x = -3$
27. $x = 0$ or $x = -2$ or $x = 6$	28. $x = -4$ or $x = -5$
29. $x = -2$	30. $x = 0$ or $x = \frac{-2}{3}$ or $x = \frac{2}{3}$
31. $p = \frac{-4}{3}$ or $p = -4$	32. $x = \frac{-8}{7}$ or $x = \frac{8}{7}$
33. $x = \sqrt{5}$ or $x = -\sqrt{5}$	34. $x = \sqrt{\frac{1}{2}}$ or $x = -\sqrt{\frac{1}{2}}$
35. $x = -4$ or $x = \sqrt{\frac{3}{2}}$ or $x = -\sqrt{\frac{3}{2}}$	36. $x = 7$ or $x = 1$
37. $x = 10 - 2\sqrt{5}$ or $x = 10 + 2\sqrt{5}$	38. $x = 2\sqrt{6}$ or $x = -2\sqrt{6}$
39. $x = -2\sqrt{10}$ or $x = 2\sqrt{10}$	

SELECTED SOLUTIONS

1. $2x^2 + 15x + 18 = 0 \Rightarrow 2x^2 + 12x + 3x + 18 = 0 \Rightarrow 2x(x+6) + 3(x+6) \Rightarrow$
$\Rightarrow (x+6)(2x+3) = 0 \Rightarrow x+6 = 0$ or $2x+3 = 0 \Rightarrow x = -6$ or $x = \frac{-3}{2}$.

3. $3x^2 + 6x + 4x + 8 = 0 \Rightarrow 3x(x+2) + 4(x+2) = 0 \Rightarrow (x+2)(3x+4) = 0 \Rightarrow$
$\Rightarrow x+2 = 0$ or $3x+4 = 0 \Rightarrow x = -2$ or $x = \frac{-4}{3}$.

7. $\theta^2 - 25 = 0 \Rightarrow \theta^2 - 5^2 = 0 \Rightarrow (\theta+5)(\theta-5) = 0 \Rightarrow \theta+5 = 0$ or $\theta-5 = 0 \Rightarrow$
$\Rightarrow \theta = -5$ or $\theta = 5$.

13. $5x^3 - 20x + 3x^2 - 12 = 0 \Rightarrow 5x(x^2-4) + 3(x^2-4) = 0 \Rightarrow (x^2-4)(5x+3) = 0 \Rightarrow$
$\Rightarrow (x+2)(x-2)(5x+3) = 0 \Rightarrow x+2 = 0$ or $x-2 = 0$ or $5x+3 = 0 \Rightarrow$
$\Rightarrow x = -2$ or $x = 2$ or $x = \frac{-3}{5}$.

17. $x^3 + x^2 = 0 \Rightarrow x^2(x+1) = 0 \Rightarrow x^2 = 0$ or $x+1 = 0 \Rightarrow x = 0$ or $x = -1$.

21. $20x^3 + 50x^2 - 30x = 0 \Rightarrow 10x(2x^2 + 5x - 3) = 0 \Rightarrow 10x = 0$ or $2x^2 + 5x - 3 = 0 \Rightarrow$
$\Rightarrow x = 0$ or $2x^2 + 6x - 1x - 3 = 0 \Rightarrow x = 0$ or $2x(x+3) - (x+3) = 0 \Rightarrow$
$\Rightarrow x = 0$ or $(x+3)(2x-1) = 0 \Rightarrow x = 0$ or $x+3 = 0$ or $2x-1 = 0 \Rightarrow$
$\Rightarrow x = 0$ or $x = -3$ or $x = \frac{1}{2}$.

27. $x^5 - 4x^4 - 12x^3 = 0 \Rightarrow x^3(x^2 - 4x - 12) = 0 \Rightarrow x^3 = 0$ or $x^2 - 4x - 12 = 0 \Rightarrow$
$\Rightarrow x = 0$ or $x^2 + 2x - 6x - 12 = 0 \Rightarrow x = 0$ or $x(x+2) - 6(x+2) = 0 \Rightarrow$
$\Rightarrow x = 0$ or $(x+2)(x-6) = 0 \Rightarrow x = 0$ or $x+2 = 0$ or $x-6 = 0 \Rightarrow$
$\Rightarrow x = 0$ or $x = -2$ or $x = 6$.

33. $x^4 - 25 = 0 \Rightarrow (x^2)^2 - 5^2 = 0 \Rightarrow (x^2+5)(x^2-5) = 0 \Rightarrow$
$\Rightarrow x^2 + 5 = 0$ or $x^2 - 5 = 0 \Rightarrow x^2 = -5$ or $x^2 = 5 \Rightarrow x = \pm\sqrt{5}$.

37. $(x-10)^2 - 20 = 0 \Rightarrow (x-10)^2 - \left(\sqrt{20}\right)^2 = 0 \Rightarrow$
$\Rightarrow [(x-10)+\sqrt{20}][(x-10)-\sqrt{20}] = 0 \Rightarrow (x-10)+\sqrt{20} = 0$ or $(x-10)-\sqrt{20} = 0 \Rightarrow$
$\Rightarrow x = 10 - \sqrt{20}$ or $x = 10 + \sqrt{20} \Rightarrow x = 10 - \sqrt{4 \cdot 5}$ or $x = 10 + \sqrt{4 \cdot 5} \Rightarrow$
$\Rightarrow x = 10 - 2\sqrt{5}$ or $x = 10 + 2\sqrt{5}$.

39. $3x^2 - 120 = 0 \Rightarrow 3(x^2 - 40) = 0 \Rightarrow x^2 - 40 = 0 \Rightarrow x^2 - \left(\sqrt{40}\right)^2 = 0 \Rightarrow$
$\Rightarrow (x+\sqrt{40})(x-\sqrt{40}) = 0 \Rightarrow x+\sqrt{40} = 0$ or $x-\sqrt{40} = 0 \Rightarrow$
$\Rightarrow x = -\sqrt{40}$ or $x = \sqrt{40} \Rightarrow x = -\sqrt{4 \cdot 10}$ or $x = \sqrt{4 \cdot 10} \Rightarrow x = -2\sqrt{10}$ or $x = 2\sqrt{10}$.

"Only he who never plays, never loses."