Elementary Algebra Problem Set Solutions

1. $2^3 \cdot 2^4 = 2^7 = 128$
2. $\frac{1}{5^2} \cdot (25^2 - 5^2) = \frac{1}{25} \cdot (625 - 25) = \frac{600}{25} = 24$
3. $3^x = 27 \Rightarrow x = 3$
4. $\sqrt[3]{64} + \sqrt{49} = 4 + 7 = 11$
5. $\left(\frac{2}{3}\right)^{-3} = \left(\frac{3}{2}\right)^3 = \frac{27}{8}$
6. $x^2 - 4 = (x + 2)(x - 2)$
7. $4a + 5 = 21 \Rightarrow a = 4$
8. $2x - 3 = 0 \Rightarrow x = \frac{3}{2}$
9. $(x - 5)(x - 2) = 0 \Rightarrow x = 5$ or $x = 2$
10. $\frac{\frac{2}{3}}{\frac{4}{5}} = \frac{2}{3} \cdot \frac{5}{4} = \frac{5}{6}$
11. $\sqrt[5]{32} = 2$
12. $x^2 - 5x + 6 = 0 \Rightarrow (x - 2)(x - 3) = 0 \Rightarrow x = 2$ or $x = 3$
13. $$\begin{aligned} x + y &= 10 \\ 2x - y &= 8 \\ (x, y) &= (6, 4) \end{aligned}$$
14. $(2x - 3y)^2 = 4x^2 - 12xy + 9y^2$
15. $\frac{15x^2y^2}{3xy} = 5xy$ as long as $x \neq 0$ and $y \neq 0$
16. $2y + 5 = 3y - 2 \Rightarrow y = 7$
17. $x^2 - 5x = 0 \Rightarrow x(x - 5) = 0 \Rightarrow x = 0$ or $x = 5$
18. $(a + b)(a - b) = a^2 - b^2$

19. $2^{3x} = 32 \Rightarrow 3x = 5 \Rightarrow x = \frac{5}{3}$

20. $2x + 1 > 5 \Rightarrow x > 2$

21. Area of a triangle $= \frac{1}{2} \cdot \text{base} \cdot \text{height} = \frac{1}{2} \cdot 10 \cdot 7 = 35 \text{ cm}^2$

22. $x^2 + 6x + 9 = 0 \Rightarrow (x + 3)^2 = 0 \Rightarrow x = -3$

23. $f(2) = 2^3 + 5 \cdot 2^2 - 2 + 3 = 8 + 20 - 2 + 3 = 29$

24.

$$\begin{aligned} 3a + 4b &= 15 \\ 5a - 3b &= 10.5 \\ (a, b) &= (3, 1.5) \end{aligned}$$

25. $\sum_{k=1}^{5} k^2 = 1 + 4 + 9 + 16 + 25 = 55$

26. $f(-2) = 2(-2)^2 - 4(-2) + 1 = 8 + 8 + 1 = 17$

27. Hypotenuse $= \sqrt{3^2 + 4^2} = 5$ cm

28. $\log_2(64) = 6$

29. $5^2 - 2^3 = 25 - 8 = 17.$

30. $(3x^2 \cdot x^3)/(x^4) = 3x^{2+3-4} = 3x.$

31. $4^y = 64 \Rightarrow 2^{2y} = 2^6 \Rightarrow 2y = 6 \Rightarrow y = 3.$

32. 81 as a power of 3 is 3^4.

33. $\left(\frac{4}{7}\right)^2 \cdot \left(\frac{7}{4}\right) = \frac{4}{7}.$

34. $x^2 - 9x + 14$ factors to $(x - 2)(x - 7)$.

35. $5x - 9 = 3x + 7 \Rightarrow 2x = 16 \Rightarrow x = 8.$

36. $(x + 3)(x + 4) = 0 \Rightarrow x = -3$ or $x = -4.$

37. $x^{1/2} = 16 \Rightarrow x = 16^2 = 256.$

38. $\frac{5}{8} + \frac{5}{12} = \frac{15}{24} + \frac{10}{24} = \frac{25}{24}.$

39. $\log_3 27 = x \Rightarrow 3^x = 27 \Rightarrow x = 3.$

40. $(3x + 4)^2 = 9x^2 + 24x + 16.$

41. $\frac{3x}{2y} \cdot \frac{4y}{5x} = \frac{12xy}{10xy} = \frac{6}{5}.$

42. $6 = 2x - 4x \Rightarrow -2x = 6 \Rightarrow x = -3$.

43. $(x+5)^2 = x^2 + 10x + 25$.

44. $x^3 = 125 \Rightarrow x = 5$.

45. $2^{2x} \cdot 2^5 = 2^{2x+5}$.

46. $3x - 6 < 9 \Rightarrow x < 5$.

47. Perimeter of a square $=$ $4 \times$ side length $= 4 \times 5 = 20$ cm.

48. $16x^2 - 9 = 0$ by factoring: $(4x-3)(4x+3) = 0 \Rightarrow x = \frac{3}{4}$ or $x = -\frac{3}{4}$.

49. Result of dividing $x^2 + 3x + 2$ by $x + 2$ is $x + 1$ if $x \neq -2$

50.

$$\begin{aligned} 5a - 4b &= 4 \\ a + 3b &= 16 \\ (a, b) &= (4, 4) \end{aligned}$$

51. $\sum_{n=1}^{4} 2^n = 2 + 4 + 8 + 16 = 30$.

52. $f(3) = 3^2 - 6 \cdot 3 + 9 = 9 - 18 + 9 = 0$.

53. The volume of a cube $=$ side$^3 = 4^3 = 64$ cm^3.

54. Slope of the line through $(1, 2)$ and $(3, 6)$ is $\frac{6-2}{3-1} = \frac{4}{2} = 2$.