

HW 55

1.  $\log_2 K - \log_2 3^{1/2}$

$$\log_2 \left( \frac{K}{3^{1/2}} \right) \text{ OR } \log_2 \left( \frac{K}{\sqrt{3}} \right)$$

2.  $\log a + \log t^3 - \log w$

$$\log \left( \frac{at^3}{w} \right)$$

3.  $\log_2 w^3 - \log_2 (x^2)^4$

$$\log_2 \left( \frac{w^3}{x^8} \right)$$

4.  $\log_2 r + \log_2 \sqrt{s} - \log_2 t^3$

$$\log_2 r + \frac{1}{2} \log_2 s - 3 \log_2 t$$

5.  $\log_7 v + \log_7 \sqrt[5]{w}$

$$\log_7 v + \frac{1}{5} \log_7 w$$

6.  $\log_5 c + \log_5 \sqrt[3]{b}$

$$\log_5 c + \frac{1}{3} \log_5 b$$

7.  $\log_3 81^2 = x$

$$3^x = 81^2$$

$$3^x = (3^4)^2$$

$$\boxed{x=8}$$

8.  $\log_2 \left( \frac{1}{2} \right)^4 = x$

$$2^x = \left( \frac{1}{2} \right)^4$$

$$2^x = 2^{-1(4)}$$

$$\boxed{x=-4}$$

9.  $\log_5 \left( \frac{1}{25} \right)^3 = x$

$$5^x = \left( \frac{1}{25} \right)^3$$

$$5^x = 5^{-2(3)}$$

$$\boxed{x=-6}$$

10.  $\log 20 + \log 5$

$$\log(20 \cdot 5)$$

$$\log 100 = x$$

$$10^x = 100$$

$$\boxed{x=2}$$

11.  $\log_2 16 - \log_2 2$

$$\log_2 \left( \frac{16}{2} \right)$$

$$\log_2 8 = x$$

$$2^x = 8$$

$$\boxed{x=3}$$

12.  $\log_2 32 - \log_2 128$

$$\log_2 \left( \frac{32}{128} \right)$$

$$\log_2 \left( \frac{1}{4} \right) = x$$

$$2^x = \frac{1}{4}$$

$$2^x = 2^{-2}$$

$$\boxed{x=-2}$$

$$13. \log_3 3 + \log_3 27$$

$$\log_3 3 = x \quad \log_3 27 = x$$

$$3^x = 3$$

$$x = 1$$

$$3^x = 27$$

$$3^x = 3^3$$

$$\boxed{x = 3}$$

$$1 + 3 = \boxed{4}$$

$$14. \log_2 160 - \log_2 5$$

$$\log_2 \left( \frac{160}{5} \right)$$

$$\log_2 (32) = x$$

$$2^x = 32$$

$$\boxed{x = 5}$$

$$15. \log_8 4 + \log_8 16$$

$$\log_8 64 = x$$

$$8^x = 64$$

$$\boxed{x = 2}$$

$$16. 3^2 = x + 4$$

$$9 = x + 4$$

$$\boxed{5 = x}$$

$$17. 2^4 = 1 + \frac{x}{2}$$

$$16 = 1 + \frac{x}{2}$$

$$15 = \frac{x}{2}$$

$$\boxed{30 = x}$$

$$18. \log x - \log 6 = \log 15$$

$$-\log 15 - \log 15$$

$$\log x - \log 6 - \log 15 = 0$$

$$\log \left( \frac{x}{6 \cdot 15} \right) = 0$$

$$10^0 = \frac{x}{90}$$

$$1 = \frac{x}{90}$$

$$\boxed{90 = x}$$

$$19. \log x + \log 2 = \log 8$$

$$\log x + \log 2 - \log 8 = 0$$

$$\log \left( \frac{2x}{8} \right) = 0$$

$$10^0 = \frac{x}{4}$$

$$1 = \frac{x}{4}$$

$$\boxed{4 = x}$$

$$20. \log (x(x+9)) = 1$$

$$10^1 = x^2 + 9x$$

$$0 = x^2 + 9x - 10$$

$$0 = (x+10)(x-1)$$

$$\boxed{x = -10, x = 1}$$

$$21. \log \left( \frac{45x}{3} \right) = 1$$

$$10^1 = 15x$$

$$\frac{10}{15} = \frac{15x}{15}$$

$$\boxed{\frac{2}{3} = x}$$

$$22. \log(x(x+3)) = 1$$

$$10^1 = x^2 + 3x$$

$$0 = x^2 + 3x - 10$$

$$0 = (x+5)(x-2)$$

$$\boxed{x = -5, x = 2}$$

$$23. \log 8 + \log x^3 = 3$$

$$\log 8x^3 = 3$$

$$10^3 = 8x^3$$

$$1000 = 8x^3$$

$$\left(\frac{1000}{8}\right)^{1/3} = (x^3)^{1/3}$$

$$\frac{10}{2} = x$$

$$\boxed{5 = x}$$

$$24. \log x^2 - \log 4 = 0$$

$$\log\left(\frac{x^2}{4}\right) = 0$$

$$10^0 = \frac{x^2}{4}$$

$$1 = \frac{x^2}{4}$$

$$4 = x^2$$

$$\boxed{\pm 2 = x}$$

$$25. \frac{\log 3}{\log a}$$

$$26. \frac{\log 27}{\log 5}$$

$$27. \frac{\log 22}{\log 7}$$

$$28. \frac{\log 46}{\log 8}$$

$$29. \frac{\log x}{\log 9}$$

$$30. \log_7 3 = x$$

$$\boxed{\frac{\log 3}{\log 7} = x}$$

$$31. \log_{12} 47 = x$$

$$\boxed{\frac{\log 47}{\log 12} = x}$$

$$32. \log_5 24 = x - 2$$

$$\frac{\log 24}{\log 5} = x - 2$$

$$\boxed{\frac{\log 24}{\log 5} + 2 = x}$$

$$33. \log_9 14 = 2x$$

$$\frac{\log 14}{\log 9} = 2x$$

$$\boxed{\frac{\log 14}{2 \cdot \log 9} = x}$$

$$34. \log_{13} 92 = 4x - 9$$

$$\frac{\log 92}{\log 13} = 4x - 9$$

$$\frac{\log 92}{\log 13} + 9 = 4x$$

$$\boxed{\frac{\log 92}{4 \log 13} + \frac{9}{4} = x}$$

$$35. 4^x = 10$$

$$\log_4 10 = x$$

$$\boxed{\frac{\log 10}{\log 4} = x}$$

$$36. 8^x = 9$$

$$\log_8 9 = x$$

$$\boxed{\frac{\log 9}{\log 8} = x}$$

$$37. 12^x = 15$$

$$\log_{12} 15 = x$$

$$\boxed{\frac{\log 15}{\log 12} = x}$$

$$38. 7^{3-x} = 16$$

$$\log_7 16 = 3 - x$$

$$\frac{\log 16}{\log 7} = 3 - x$$

$$\boxed{x = 3 - \frac{\log 16}{\log 7}}$$