

Write the equation in exponential form.

1. $\log_2 1024 = 10$

$2^{10} = 1024$

2. $\log x = y$

$10^y = x$

3. $\log_5 25 = 2$

$5^2 = 25$

4. $\ln 5 = x$

$e^x = 5$

Write the equation in logarithmic form.

5. $2^6 = 64$

$\log_2 64 = 6$

6. $10^x = 74$

$\log 74 = x$

7. $5^3 = 125$

$\log_5 125 = 3$

8. $e^3 = x$

$\ln x = 3$

Evaluate the expression without using a calculator.

9. $\log_2 128 = x = \boxed{7}$

$2^x = 128$

$2^x = 2^7$

$x = 7$

11. $\ln(e^6)$

$= 6 \ln e$

$= 6 \cdot 1$

$= \boxed{6}$

13. $e^{2 \ln 7} = \boxed{49}$

$e^{\ln 7^2} = x$

$\ln x = \ln 7^2$

$x = 49$

15. $\log_5 250 - \log_5 2 = \boxed{3}$

$= \log_5 \left(\frac{250}{2} \right)$

$= \log_5 125$

$= 3$

10. $\log_2 2^7$
 $= 7 \log_2 2$
 $= 7 \cdot 1$
 $= \boxed{7}$

12. $\ln(e^8)$
 $= 8 \ln e$
 $= 8 \cdot 1$
 $= \boxed{8}$

14. $\log 25 + \log 4$
 $\log(100) = \boxed{2}$

16. $\log_8 6 - \log_8 3 + \log_8 2 = \boxed{\frac{2}{3}}$
 $= \log_8 \left(\frac{6}{3} \right) + \log_8 2$

$= \log_8 (2 \cdot 2)$

$= \log_8 4 = x$

$8^x = 4 \rightarrow 2^{3x} = 2^2$
 $3x = 2 \rightarrow x = \frac{2}{3}$

Solve for x.

17. $2^{x+6} = 4$

$$2^{x+6} = 2^2$$

$$x+6 = 2$$

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

19. $8e^{2x} = 20$

$$e^{2x} = \frac{5}{2}$$

$$\ln\left(\frac{5}{2}\right) = 2x$$

$$\boxed{x = 0.4581}$$

21. $\log_3 x^6 = 12$

$$(3^{12})^{\frac{1}{6}} = (x^6)^{\frac{1}{6}}$$

$$x = \pm(3^2)$$

$$\boxed{x = \pm 9}$$

23. $\log(x+9) = \log(2x-7)$

$$x+9 = 2x-7$$

$$\boxed{x = 16}$$

25. $\log(x-1)^2 = \log(-5x-1)$

$$(x-1)^2 = -5x-1$$

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

$$(x+2)(x+1) = 0 \quad \boxed{x = -2 \text{ or } -1}$$

Evaluate.

27. $\log_3 15$

28. $\log_5 16$

29. $\log_6 92$

Combine into a single logarithm

30. $\log_3 5 + 5 \log_3 2$

$$\log_3 5 + \log_3 32$$

$$\boxed{\log_3 160}$$

31. $\log 12 + \frac{1}{2} \log 7 - \log 2$

$$\log 12 + \log 7^{\frac{1}{2}} - \log 2$$

$$\log(12\sqrt{7}) - \log 2$$

$$\boxed{\log(6\sqrt{7})}$$

32. $\log x + 2 \log y - 3 \log z$

$$\log x + \log y^2 - \log z^3$$

$$\log xy^2 - \log z^3$$

$$\boxed{\log \frac{xy^2}{z^3}}$$

18. $e^{1-4x} = 2$

$$e \ln 2 = 1 - 4x$$

$$-0.3069 = 1 - 4x$$

$$\boxed{x = 0.0767}$$

20. $\left(\frac{1}{27}\right)^{x-6} = 27$

$$27^{-(x-6)} = 27$$

$$6 - x = 1$$

$$\boxed{x = 5}$$

22. $\log_4(x-6)^3 = 6$

$$(4^6)^{\frac{1}{3}} = ((x-6)^3)^{\frac{1}{3}}$$

$$4^2 = x-6$$

$$16 = x-6$$

$$\boxed{x = 22}$$

24. $\log x^2 + \log 25 = 2$

$$\log(25x^2) = 2$$

$$100 = 25x^2$$

$$x^2 = 4$$

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

26. $\log x^3 = 12$

$$(10^{12})^{\frac{1}{3}} = (x^3)^{\frac{1}{3}}$$

$$\boxed{x = 10,000}$$