

Convert log \rightarrow exp ; exp \rightarrow same base \rightarrow $\phi \rightarrow$ convert to log

Solving Logarithm and Exponential Functions

Solve each problem, starting with the one that seems easiest and working your way towards the more difficult problems.

1. $\log_3(x+4) = 2$

$$3^2 = x+4$$

$$9 = x+4$$

Answer:

$$x=5$$

2. $2^x(8^{-3x}) = 4^x$

$$2^x 2^{-3x} = 2^{2x} \quad -2x = 2x$$

$$2^{x-3x} = 2^{2x}$$

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

Answer:

$$x=0$$

3. $2^{x+1} = 5$

$$2^? = 5 \quad \text{convert}$$

$$\log_2 5 = x+1 \quad \frac{\log 5}{\log 2} = x+1$$

Answer:

$$\frac{.7}{.3} = x+1$$

$$2.3 = x+1$$

$$x=1.3$$

4. $400e^{0.2x} = 600$

$$\frac{400}{400} \frac{400}{400} e^{.2x} = 1.5$$

$$\ln e^{1.5} = .2x$$

$$1 = \frac{\ln 1.5}{.2} = .2x$$

Answer:

$$\frac{.41}{.2} = \frac{.2x}{.2}$$

$$x = .205$$

5. $\log_x\left(\frac{1}{8}\right) = 3$

$$\sqrt[3]{x^3} = \sqrt[3]{\frac{1}{8}}$$

$$\frac{\sqrt[3]{1}}{\sqrt[3]{8}} = \frac{1}{2}$$

Answer:

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

6. $\log_{1/9}(x^2) = 1$

$$\left(\frac{1}{9}\right)^1 = x^2$$
$$\sqrt{\frac{1}{9}} = \sqrt{x^2}$$

Answer:

$$x = \pm \frac{1}{3}$$

7. $\log_3(x-1)^2 = 2$

$$3^2 = (x-1)^2$$
$$\sqrt{9} = \sqrt{(x-1)^2}$$

$$3^2 = 3^2 \checkmark$$

$$3 = x-1$$
$$x = 4$$

Answer:

8. $2^{x+2} = 5^4$

$$2^{x+2} = 625$$

$$\log_2 625 = x+2$$

$$\frac{\log 625}{\log 2} = x+2$$

Answer:

$$9.3 = x+2$$
$$\begin{array}{r} -2 \\ \hline x = 7.3 \end{array}$$

$$9. \ln(x^2 - 48) = \ln(2x)$$

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$$x^2 - 48 = 2x$$

$$x^2 - 2x - 48 = 0$$

$$(x - 8)(x + 6)$$

$$x = 8 \text{ \& } -6$$

Answer:

$$*10. 18^w = 4^{2w+1}$$

Answer:

