Solving Exponential and Logarithmic Equations

The definition and properties of logarithms can be used to solve equations in which either powers or logarithms appear. If the unknown occurs in an exponent then the strategy is to isolate it by taking the logarithm of both sides.

Ex.1 Solve
$$3^{x+2} = 4$$
(a) using definition of logarithms. (b) by taking the log (base 10) of both sides.

(a) $y = a^x \Rightarrow x = log_a y$
 $y = 3^{x+2} \Rightarrow x + 2 = log_3 y$
 $y = 10^{x} \Rightarrow x = log_3 y$
 $y =$

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Ex.2 Solve
$$\log_2 x - \log_2 3 = \log_2 6$$

$$\log_2 x = \log_2 b + \log_2 3$$

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$$\log_2 x = \log_2 b + \log_2 3$$

$$\Rightarrow x = \log_2 b$$

Ex.3 Solve
$$6^{3x} = 4^{2x-3}$$
 $\log 6^3 = \log 4$
 $(3x) \log 6 = (2x-3) \log 4$
 $3x \log 6 = 2x \log 4 - 3 \log 4$
 $3x \log 6 - 2x \log 4 = -3 \log 4$
 $x(3 \log 6 - 2 \log 4) = -3 \log 4$
 $x = \frac{-3 \log 4}{3 \log 6 - 2 \log 4}$

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Ex.4 Solve
$$\log_{x} 0.04 = -2$$

$$\chi^{-2} = 0.04$$

$$\frac{1}{x^{2}} = 0.04$$

$$\frac{1}{0.04} = \chi^{2}$$

$$75 = \chi^{2}$$

$$\chi = \pm 5$$

$$\chi = 5$$

$$\chi = 5$$

Ex.5 Solve
$$\log(x+2) + \log(x-1) = 1$$

$$\log_{0}(x+2)(x-1) = 1$$

$$\det_{0}(x+2)(x-1) = 1$$

$$\det_{0}(x+2)(x-1) = 1$$

$$\det_{0}(x+2)(x-1) = \log_{0}(10)$$

$$\Rightarrow (x+2)(x-1) = 10$$

$$\chi^{2} + \chi - 2 = 10$$

$$\chi^{2} + \chi - 12 = 0$$

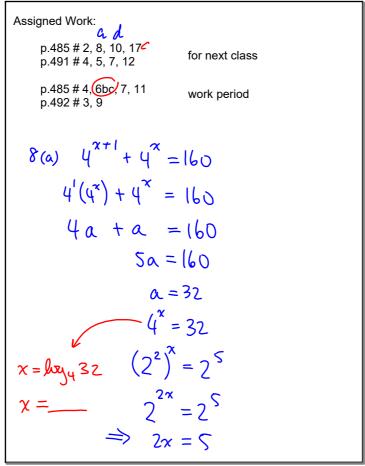
$$(\chi + \chi)(\chi - 3) = 0$$

$$\chi^{2} + \chi - 12 = 0$$

$$(\chi + \chi)(\chi - 3) = 0$$

$$\chi^{2} + \chi - 12 = 0$$

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$$10.(d) \quad X = \log_{2}(53.2)$$

$$= \frac{\log 53.2}{\log 2}$$

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6 b c

$$A = P(1+r)$$

$$rate = interest per comp. period$$

(b) $SODO = (1000)(1 + \frac{0.12}{12})$

$$S = (1.01)$$

$$S$$

17. (c)
$$3(2^{x}) = 4^{x+1}$$

 $\log [3(2^{x})] = \log [4^{x+1}]$
 $\log 3 + \log 2^{x} = \log 4^{x+1}$
 $\log 3 + x \log 2 = (x+1) \log 4$
 $\log 3 + x \log 2 = x \log 4 + \log 4$
 $\log 3 + x \log 2 = x \log 4 - \log 3$
 $\log 3 + x \log 4 = \log 4 - \log 3$
 $\log 3 + x \log 4 = \log 4 - \log 3$
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 $\log 3 + x \log 4 - \log 3$
 $\log 3 + x \log 4 - \log 3$

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$$a = b$$

$$3a = 3b$$

$$a^{2} = b^{2}$$

$$2^{a} = 2^{b}$$

$$2^{a} = 2^{b}$$

$$2^{a} = 2^{b}$$

$$2^{a} = b^{2}$$

$$2^{a} = 2^{b}$$

$$2^{a} = b^{2}$$

$$2^{a} = b^$$

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