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CRMA 0372
College Readiness Algebra II
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$\log_b x = y$ means $b^y = x$

$b > 0$, $x > 0$

$b \neq 1$

$\log_4 64 = ?$ $\quad 4^? = 64$

$\log_4 64 = 3$ $\quad 4^3 = 64$

$\log_4 \frac{1}{64} = ?$ $\quad 4^? = \frac{1}{64}$

$\log_4 \frac{1}{64} = -3$ $\quad 4^? = \frac{1}{4^3}$

$4^? = 4^{-3}$

$b^m = b^n$

then, $m = n$

$2^x = 2^3$

then, $x = 3$

$\log_8 8 + \log_8 1$

$= 1 + 0$

$= 1$

$\log_8 8 + \log_8 1$

$\Rightarrow = \log_8 (8 \cdot 1)$

$= \log_8 8$

$= 1$

Product Rule for logarithms:

$$\log_b (xy) = \log_b x + \log_b y$$

Quotient Rule for logarithms:

$$\log_b \left(\frac{x}{y}\right) = \log_b x - \log_b y$$

Power Rule for logarithms:

$$\log_b x^n = n \log_b x$$

$\log_3 11 + \log_3 2 = \log_3 22$

$\log_4 5 - \log_4 11 = \log_4 \frac{5}{11}$

$\log_8 \left(\frac{1}{9}\right) = 2 \log_8 \square$

$\log_8 \frac{1}{3^2} = 2 \log_8 \frac{1}{3}$

$16^x = 64$

$(2^4)^x = 2^6$

$2^{4x} = 2^6$

$4x = 6$

$x = 6/4 = 3/2$

$25^x = 125$

$(5^2)^x = 5^3$

$5^{2x} = 5^3$

$2x = 3$

$x = 3/2$

$25^{3/2} = 125$

$(\sqrt{25})^3 = 125$

$5^3 = 125$

$125 = 125$

$4^{x-1} = 8^x$

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

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

$2x - 2 = 3x$

$x = -2$

$3^x = \frac{1}{243}$

$3^x = \frac{1}{3^5}$

$3^x = 3^{-5}$

$x = -5$

$\left(\frac{3}{2}\right)^x = \frac{16}{81}$

$\left(\frac{3}{2}\right)^x = \frac{2^4}{3^4}$

$\left(\frac{3}{2}\right)^x = \left(\frac{2}{3}\right)^4$

$\left(\frac{3}{2}\right)^x = \left(\frac{3}{2}\right)^{-4}$

$x = -4$

Write using logarithmic form:

$8^2 = 64$

$\log_8 64 = 2$

Write using exponential form:

$\log_{1/2} 4 = -2$ $\qquad$ $\left(\frac{1}{2}\right)^{-2} = 4$

Solve for x :

$\log_4 x = -3$

$4^{-3} = x$

$x = \frac{1}{4^3}$

$x = \frac{1}{64}$

$\log_9 (2x+1) = 2$

$2x+1 = 9^2$

$2x+1 = 81$

$2x = 80$

$x = 40$

$\log_x 12 = 2$

$x^2 = 12$

$x = \pm\sqrt{12}$

$x = \pm \sqrt{4}\cdot\sqrt{3}$

$x = \pm 2\sqrt{3}$

use product rule to rewrite

$\log_6 (5.3) = \log_6 5 + \log_6 3$

$\log_5 7 + \log_5 3 = \log_5 (7.3) = \log_5 21$

$\log_4 4x = \log_4 4 + \log_4 x = 1 + \log_4 x$

use power rule

$\log_5 x^4 = 4 \log_5 x$

$\log \frac{y}{x^7} = \log y - \log x^7 = \log y - 7 \log x$

write as a single log.

$6 \log_b x - \frac{1}{5} \log_b y + 2 \log_b w$

$= \log_b x^6 - \log_b y^{\frac{1}{5}} + \log_b w^2$

$= \log \left(\frac{x^6}{y^{1/5}} \right) + \log_b w^2$

$= \log \left(\frac{x^6 w^2}{y^{1/5}} \right)$

write as a single log:

$$2\log_3 y + 4(\log_3 w - 4\log_3 z)$$

$$= 2\log_3 y + 4\log_3 w - 16\log_3 z$$

$$= \log_3 y^2 + \log_3 w^4 - \log_3 z^{16}$$

$$= \log_3 \left(\frac{y^2 w^4}{z^{16}}\right)$$

Solve for x:

$$-\log_4(x-2) = 1 - \log_4(x-5)$$

$$-\log_4(x-2) + \log_4(x-5) = 1$$

$$\log_4(x-5) - \log_4(x-2) = 1$$

$$\log_4 \frac{x-5}{x-2} = 1$$

$$(x-2)4^1 = \left(\frac{x-5}{x-2}\right)(x-2)$$

$$4(x-2) = x-5$$

$$4x-8 = x-5$$

$$3x = 3$$

$$x = 1$$

Solve for x:

$$\log_2(x+6) = -\log_2(x+4) + 3$$

$$\log_2(x+6) + \log_2(x+4) = 3$$

$$\log_2\left[(x+6)(x+4)\right] = 3$$

$$\log_2(x^2+10x+24) = 3$$

$$x^2+10x+24 = 8$$

$$x^2+10x+16 = 0$$

$$(x+8)(x+2) = 0$$

$x+8=0$ or $x+2=0$

$x=-8$ $\qquad$ $x=-2$

$x \neq -8$ $\qquad$ $x=-2$