Use the properties of Logarithms to solve the equations below.

1) $\log_{15}(3x) = \log_{15}(4x - 10)$

$$3x = 4x - 10$$
$$x = 10$$

2) $2\log_8(x) = -2$

$$\log_8 x^2 \quad \log_8 x = -1$$
$$8^{-1} = x$$
$$\frac{1}{8} = x$$

3) $\log(4) + \log(x) = \log(64)$

$$\log 4x = \log 64$$
$$4x = 64$$
$$x = 16$$

4) $\log_6(2x) - \log_6(10) = 1$

$$\log_6 \frac{2x}{10} = 1$$
$$6^1 = \frac{2x}{10}$$
$$60 = 2x$$
$$30 = x$$

5) $\log_7(2x - 8) + \log_7(2) = \log_7(66)$

$$\log_7 (2x-8)(2) = \log_7 66$$
$$4x - 16 = 66$$
$$4x = 82$$
$$x = 20.5$$

6) $\log_2(x - 5) - \log_2(x + 4) = 4$

$$\log_2 \frac{x-5}{x+4} = 4$$
$$2^4 = \frac{x-5}{x+4}$$
$$16 = \frac{x-5}{x+4}$$
$$16x + 64 = x - 5$$
$$15x = 69$$
$$x = -4.6 \quad \text{*Always check negative answers*}$$

No Solution!
$\log_2(-4.6+5) \Rightarrow$ No $\log(+)$

Name:_____

Worksheet

Date:_____ Per. _____

1) $\log_6(5x - 6) = \log_6(2x)$

$5x - 6 = 2x$

$3x = 6$

$\boxed{X = 2}$

2) $\log_8(-x + 7) = \log_8(-2x - 7)$

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

$\boxed{X = -14}$

3) $5 + \log_2(x) = 4$

$\log_2(x) = -1$

$2^{-1} = x$

$\boxed{\frac{1}{2} = X}$

4) $\log_6(x + 7) = 0$

$6^0 = x + 7$

$1 = x + 7$

$\boxed{-6 = X}$

5) $\log_6(8) - \log_6(-5x) = \log_6(20)$

$\log_6\left(\frac{8}{-5x}\right) = \log_6(20)$

$\frac{8}{-5x} = 20$

$-100x = 8$

$\boxed{X = -0.08 \text{ or } -\frac{2}{25}}$

6) $\log_9(x) + \log_9(x + 24) = 2$

$\log_9(x(x + 24)) = 2$ ~~$X = -27$~~   No negative Logs

$9^2 = x^2 + 24x$ $\boxed{X = 3}$ only this one

$0 = x^2 + 24x - 81$

$(x + 27)(x - 3) = 0$

7) $\log_5(x) - \log_5(x + 2) = \log_5(42)$

$\log_5\left(\frac{x}{x+2}\right) = \log_5(42)$

$\frac{x}{x+2} = 42$

$42x + 84 = x$ $\boxed{X = \frac{-84}{41}}$

$84 = -41x$

8) $2\log_6(x) - \log_6(12) = \log_6(x - 3)$

$\log_6\left(\frac{x^2}{12}\right) = \log_6(x - 3)$

$\frac{x^2}{12} = (x - 3)$ $(x - 6)(x - 6) = 0$

$x^2 = 12x - 36$ $\boxed{X = 6}$

$x^2 - 12x + 36 = 0$

9) $\frac{1}{2}\log(x^4) - \log(2x - 1) = \log(x^2) + \log(2)$

$\log \frac{x^2}{2x-1} = \log(x^2(2))$ → $4x^3 - 3x^2 = 0$

$\frac{x^2}{2x-1} = 2x^2$ $x^2(4x - 3) = 0$

$4x^3 - 2x^2 = x^2$ $x^2 = 0$ $4x - 3 = 0$

~~$X = 0$~~ $\boxed{X = 3/4}$

10) $\log_5(x + 2) - \log_5(x) = \log_5(2x - 1) - \log_5(3x - 12)$

$\log_5\left(\frac{(x+2)}{x}\right) = \log_5\left(\frac{2x-1}{3x-12}\right)$

$\frac{x+2}{x} = \frac{2x-1}{3x-12}$ → $(x + 3)(x - 8) = 0$

$(x + 2)(3x - 12) = 2x^2 - x$ $\boxed{X = -3 \quad X = 8}$

$3x^2 - 12x + 6x - 24 = 2x^2 - x$

$x^2 - 5x - 24 = 0$