

7-4 Solving Logarithmic Equations & Inequalities

- solve logarithmic equations
- solve logarithmic inequalities
- A.SSE.2, A.CED.1

Solving Logarithmic Functions

$$\log_b x = y \Rightarrow x = b^y$$

Logarithm on 1 side of equation:

- rewrite as an exponential and solve. (definition of a logarithm)

Logarithm on both sides of the equation:

- Use the property of equality for logarithms:

– If ~~$\log_b x = \log_b y$~~ , then $x = y$

$$\frac{2}{x+1} = \frac{3}{x-3}$$

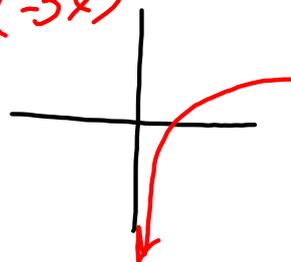
- the value of "x" cannot be negative, always check your solutions.

$$\log_5(x+3)$$

$$\log_5(-3x)$$

$$x = -5$$

$$x = 0$$



Solve.

$$\text{(def. of log)} \quad x = b^y \quad \log_b x = y$$

1. $\log_8 n = \frac{4}{3}$

$$n = 8^{\frac{4}{3}}$$

$$n = (\sqrt[3]{8})^4$$

$$n = 2^4$$

$$n = 16$$

2. $\log_{\frac{1}{10}} x = -3$

$$x = \left(\frac{1}{10}\right)^{-3}$$

$$x = 10^3$$

$$x = 1,000$$

3. ~~$\log_4(2x) = \log_4(6x-8)$~~

$$2x = 6x - 8$$

$$8 = 4x$$

$$2 = x$$

(prop of log)

4. $\log_5(3x-1) = \log_5 2x^2$

$$3x-1 = 2x^2$$

$$2x^2 - 3x + 1 = 0$$

$$2x^2 - 2x - 1x + 1$$

$$2x(x-1) - 1(x-1) = 0$$

$$(2x-1)(x-1) = 0$$

$$2x-1=0 \quad x-1=0$$

$$2x=1 \quad x=1$$

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

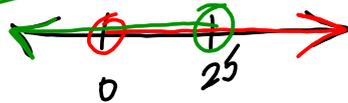
Solving Logarithmic Inequalities

- be sure to exclude any values that may make the x value of the function negative.

Solve. $x > 0$

5. $\log_5 x < 2$

$$x < 5^2 \quad \{ \mid 0 < x < 25 \}$$
$$x < 25$$

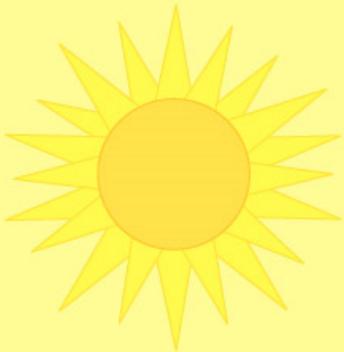
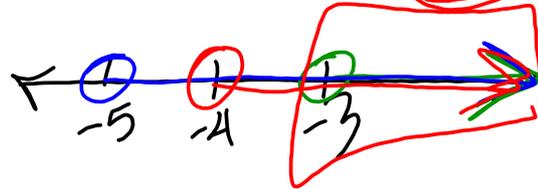


6. $\log_7(2x + 8) > \log_7(x + 5)$

$$2x + 8 > 0 \quad x + 5 > 0$$
$$2x > -8 \quad x > -5$$
$$x > -4$$

$$2x + 8 > x + 5$$

$$x > -3$$
$$2x \mid x > -3$$



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