

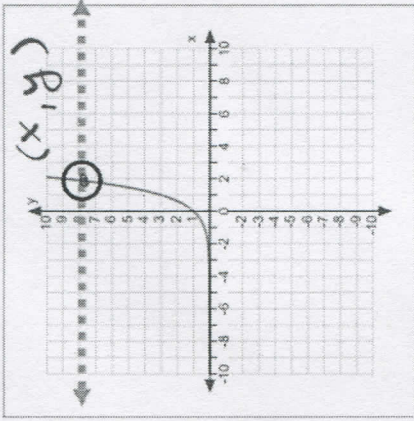
OBJECTIVE 1: Choose your method!

TASK 1: Solve the same problem two ways: $3^x = 8$

a) *Method 1: Graphing*

Type left side into $y_1 = 3^x$
 Type right side into $y_2 = 8$
 2nd Trace & 5) Intersect

$(1.893, 8)$



b) *Method 2: Algebraically*

$3^x = 8$

- 1) Log both sides
- 2) Use properties to get x alone
- 3) check for extraneous solutions

1) $\log 3^x = \log 8$
 2) $x(\log 3) = \log 8$
 3) $x = \frac{\log 8}{\log 3} \approx 1.893$

OBJECTIVE 2: Like Bases VS Unlike Bases

Now we know how to solve like bases and unlike bases using the change-of-base formula.

- Like bases: $100^x = \left(\frac{1}{10}\right)^{x+3}$
- Unlike bases (I HEART LOGS!): $2^x = 5$

TASK 2: Solve the two problems above. Leave your answer in CRF and rounded to the thousandths.

a) $100^x = \left(\frac{1}{10}\right)^{x+3}$
 $10^{2x} = 10^{-1(x+3)}$
 $2x = -x - 3$
 $3x = -3$
 $x = -1$

b) $2^x = 5$
 $\log_2 5 = x$
 $x = \frac{\log 5}{\log 2} \approx 2.322$
 (CRF) (1000ths)

c) $7^{9x} = 15$
 $\log_7 15 = 9x$
 $\frac{\log 15}{\log 7} = 9x$
 $\frac{(\log 15)}{9} = x \approx 0.155$
 (CRF)

d) $4e^{-x} - 7 = 13$
 $4e^{-x} = 20$
 $e^{-x} = 5$
 $\ln 5 = -x$
 $x = -\ln 5$ (CRF)
 $x \approx -1.609$ (1000ths)

OBJECTIVE 3: Solve Logarithmic Equations

TASK 3: Use properties to solve for x.

a) $\ln(7x - 4) = \ln(2x + 11)$

$$7x - 4 = 2x + 11$$

$$5x = 15$$

$$\boxed{x = 3}$$

b) $\log 5x + \log(x - 1) = 2$

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

$$10^2 = 5x(x - 1)$$

$$100 = 5x^2 - 5x$$

$$0 = 5x^2 - 5x - 100$$

$$0 = x^2 - x - 20 = (x - 5)(x + 4) = 0$$

~~$x = 5, -4$~~
↳ extraneous solution

$$\boxed{x = 5}$$

OBJECTIVE 4: Solve Exponential & Logarithmic Inequalities

An inequality is treated like an equal sign, but now there is a range of solutions rather than just one.

TASK 4: Get the x alone using properties.

a) $10^{2x-6} > 3$

$$\log 3 > 2x - 6$$

$$\log 3 + 6 > 2x$$

$$\frac{\log 3 + 6}{2} > x$$

b) $\log x + 9 < 45$

$$\log x < 36$$

$$10^{36} < x$$

c) $2 \ln x - 1 > 4$

$$2(\ln x) > 5$$

$$\ln x > \frac{5}{2}$$

$$e^{\frac{5}{2}} > x$$

$$e^{\frac{5}{2}} \approx 2.718$$

Notes to myself about the lesson that I do not want to forget:

only cancel if $\log = \log$ no \pm
I \heartsuit Logs when no \pm

Still need help with: