

ANSWERS WITH EXPLANATIONS

1) $\log_{x+1} 361 = 2$

Base = $x + 1$

Exponent = 2

Argument = 361

Since the unknown variable is in the base position and not in the exponent position, I know I need to change this to exponential form.

So $\log_b a = x$ translates to $b^x = a$. So, I need to solve:

$$(x + 1)^2 = 361$$

I decided that the easiest way to solve this would be to take the square root of both sides.

$$\sqrt{(x + 1)^2} = \pm\sqrt{361}$$

$$x + 1 = \pm 19$$

$$x + 1 = 19 \text{ or } x + 1 = -19$$

$$x = 18 \text{ or } x = -20$$

(although we need to eliminate the answer $x = -20$ since the base of a log cannot be negative under its domain)

2) $\log_{2.8} 12 = x - 4$

Base = 2.8

Exponent = $x - 4$

Argument = 12

Since the unknown variable is in the exponent position, I know I need to use the log form of the equation. Since my calculator doesn't do anything but base e and base 10, I will use the change of base formula to solve this.

$$\log_{2.8} 12 = x - 4$$

$$\frac{\log 12}{\log 2.8} = x - 4$$

$$2.413 = x - 4$$

$$6.413 = x$$

3) $\ln(4x - 3) = 5.7$

Base = e

Exponent = 5.7

Argument = $4x - 3$

This equation has the unknown variable in the argument position. Since it is not in the exponent position, I need to change from into exponential form.

$$\ln(4x - 3) = 5.7 \rightarrow e^{5.7} = 4x - 3$$

$$298.867 = 4x - 3$$

$$301.867 = 4x$$

$$75.467 = x$$

ADDITIONAL PRACTICE:**Part 1:**

Identify the base, the exponent, and the argument for each. Then translate each from logarithm form to exponential form. **DO NOT SOLVE.**

1. $\log_3 x = 6$

Base =

Exponent =

Argument =

Translation:

2. $\ln(6x + 1) = 44$

Base =

Exponent =

Argument =

Translation:

Part 2:

Use the change of base formula to rewrite each logarithm. Solve for x. Show your work.

3. $\log_5 30 = x$

4. $\log_{4.1} 10 = 2x - 3$

Part 3:

Determine if the following equations need to be solved in logarithm or exponential form. Translate into the appropriate form then solve showing all steps.

5. $\log_{3x+4} 125 = 3$

6. $\ln(14x - 6) = 8$

7. $\log_9 122 = x + 1.5$