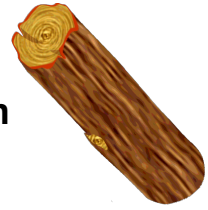


B.5 - Day 3 - Solving Logarithmic/Expo Equations

Day 3 Objective: 1. Solve exponential equations by using log power property.

Power Property

$$\log_b m^n = n \log_b m$$



*If I have a variable in the exponent position, I can "get it down" by taking the "log" of both sides.

Ex.

1.) Take the log of both sides of equation.

$$2^x = 512$$

$$\log 2^x = \log 512$$

Level 1

2.) The Power Prop. allows the exponent to move in front of log.

$$x \log 2^x = \log 512$$

3.) To solve for x, divide both sides by log (2). Use calculator!

$$\frac{x \log (2)}{\log (2)} = \frac{\log (512)}{\log (2)}$$

$$x = 9$$

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Ex.1 Solve for x. Round any decimal final answers to 4 decimal places.

Level 2

Level 2

$$3^{x-2} = 243$$

$$\log(3)^{x-2} = \log(243)$$

$$\frac{x-2 \cdot \log(3)}{\log(3)} = \frac{\log(243)}{\log(3)}$$

$$x-2 = 5$$

$$x = 7$$

$$4^{2x+1} = 4096$$

$$\log(4)^{2x+1} = \log(4096)$$

$$\frac{2x+1 \cdot \log(4)}{\log(4)} = \frac{\log(4096)}{\log(4)}$$

$$2x+1 = 6$$

$$2x = 5$$

$$x = \frac{5}{2}$$

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Ex.2 Solve for x. Round any decimal final answers to 4 decimal places. **Level 3**

$$3^x + 6 = 2193$$

-6 -6

$$\log(3)^x = \log(2187)$$

$$x \cdot \frac{\log(3)}{\log(3)} = \frac{\log(2187)}{\log(3)}$$

$$x = 7$$

$$5(2)^x - 7 = 1273$$

+7 +7

$$\frac{5(2)^x}{5} = \frac{1280}{5}$$

$$\log(2)^x = \log(256)$$

$$x = \frac{\log(256)}{\log(2)} \quad x = 8$$

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Ex.3 Solve for x. Round any decimal final answers to 4 decimal places. **Level 3**

$$\frac{20,000}{5,000} = \frac{5,000(1+.03)^x}{5,000}$$

$$4 = 1.03^x$$

$$\frac{\log(4)}{\log(1.03)} = x$$

$$x \approx 46.8995$$

Level 4

$$10 \cdot 3^{10x-9} - 8 = 62$$

$$3^{10x-9} = 7$$

$$\log(3)^{10x-9} = \log(7)$$

$$10x-9 = \frac{\log(7)}{\log(3)}$$

$$10x-9 = 1.7712$$

+9 +9

$$\frac{10x}{10} = \frac{10.7712}{10}$$

$$x \approx 1.0771$$

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