

C_23 Key U3 Solving Equations

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Unit 3 Solving Equations Practice

Name: _____

Solve each question algebraically.

1. $7^{x-2} = 2(3)^{2x+1}$

$$\log 7^{x-2} = \log (2(3)^{2x+1})$$

$$(x-2)\log 7 = \log 2 + \log 3^{2x+1}$$

$$x\log 7 - 2\log 7 = \log 2 + (2x+1)\log 3$$

$$\underline{x\log 7} - 2\log 7 = \log 2 + \underline{2x\log 3} + \log 3$$

$$x\log 7 - 2x\log 3 = \log 2 + \log 3 + 2\log 7$$

$$x(\log 7 - 2\log 3) = \log 2 + \log 3 + 2\log 7$$

$$x = \frac{\log 2 + \log 3 + 2\log 7}{(\log 7 - 2\log 3)}$$

$$x \approx -22.62$$

2. $\log_3(x+6) = \log_3 x + \log_3(x+2)$

$$\log_3(x+6) = \log_3[x(x+2)]$$

$$\log_3(x+6) = \log_3(x^2+2x)$$

$$\Rightarrow x+6 = x^2+2x$$

$$0 = x^2+2x-x-6$$

$$0 = x^2+x-6$$

$$0 = (x-2)(x+3)$$

$$x-2=0$$

$$x=2$$

$$x+3=0$$

$$x = -3$$

extraneous root, as
it makes an
argument
negative

3. $2\log_2(x+2) - \log_2(3x-2) = 2$

$$\log_2(x+2)^2 - \log_2(3x-2) = 2$$

$$\log_2\left[\frac{(x+2)^2}{3x-2}\right] = 2$$

$$\log_2\left(\frac{(x+2)(x+2)}{3x-2}\right) = 2$$

$$\log_2\left(\frac{x^2+4x+4}{3x-2}\right) = 2$$

Change to exponential form:

$$2^2 = \frac{x^2+4x+4}{3x-2}$$

$$(3x-2)4 = \frac{x^2+4x+4}{\cancel{3x-2}} \cdot \frac{\cancel{(3x-2)}}{1}$$

$$12x-8 = x^2+4x+4$$

$$0 = x^2-8x+12$$

$$0 = (x-2)(x-6)$$

$x=2$ both are ok $x=6$

4. After ten days, a 250 mg sample of phosphorus-32 decays to 218.75 mg. What is the half-life, correct to two decimal places?

$$A = A_0(b)^{t/p}$$

$$\frac{218.75}{250} = \frac{250}{250} (0.5)^{10/p}$$

$$0.875 = (0.5)^{10/p}$$

$$\log 0.875 = \log (0.5)^{10/p}$$

$$p \times \log 0.875 = \frac{10}{p} \log 0.5$$

$$\frac{p \log 0.875}{\log 0.875} = \frac{10 \log 0.5}{\log 0.875}$$

$$p = \frac{10 \log 0.5}{\log 0.875} = 51.91 \text{ days}$$