Rewrite the following with a base of 2

16

$= 2^4$

8^3

$= (2^3)^3$

$= 2^9$

$\sqrt[3]{64}^1 \times \sqrt[5]{32}^3$

$= (2^6)^{\frac{1}{2}} \times (2^5)^{3/5}$

$= 2^3 \times 2^3$

$= 2^6$

Re write the following with a base of 3

81

$= 3^4$

12

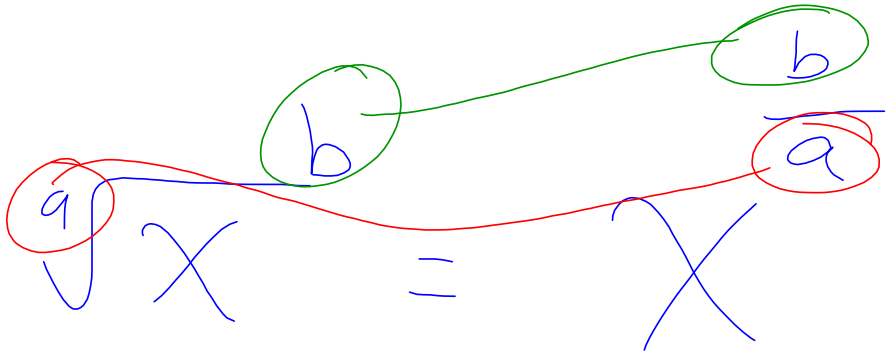
$3^x = 12$

$\log 3^x = \log 12$

$x \log 3 = \log 12$

$x = \frac{\log 12}{\log 3}$

$12 = 3^{\frac{\log 12}{\log 3}}$


b
b
a
a
x
=
x

Solve the following equations * make the bases the same *

$4^{x+5} = 64^{x}$

$4^{x+5} = 4^{3x}$

$x + 5 = 3x$

$5 = 2x$

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

$4^{2x} = 8^{x+4}$

$(2^2)^{2x} = (2^3)^{x+4}$

$2^{4x} = 2^{3x+12}$

$4x = 3x + 12$

$x = 12$

Solve: $16^{2p-3} \cdot 4^{-2p} = 2^4$

$(2^4)^{2p-3} \cdot (2^2)^{-2p} = 2^4$

$2^{8p-12} \cdot 2^{-4p+0} = 2^4$

$2^{4p-12} = 2^4$

$4p - 12 = 4$

$4p = 16$

$p = 4$

Polonium-218 is a radioactive substance. A 100 g sample of Polonium-218 is placed into a nuclear chamber. After 1 minute the same sample is only 80 g.

a) Determine the half-life of Polonium-218.

b) Graph the decay function.

a) $A(t) = A_0\left(\frac{1}{2}\right)^{t/h}$

$\frac{80}{100} = \frac{100\left(\frac{1}{2}\right)^{1/h}}{100}$

$0.8 = \left(\frac{1}{2}\right)^{x}$ Let $x = \frac{1}{h}$

$\log 0.8 = \log 0.5^{x}$

$\frac{\log 0.8}{\log 0.5} = x$

$0.322 = x$ * but $x = \frac{1}{h}$

$0.322 = \frac{1}{h}$

$h = 3.1$ mins

Solve: $4^{2x-3} = 3^{x+1}$

$\log 4^{2x-3} = \log 3^{x+1}$

$(2x-3)\log 4 = (x+1)\log 3$

$2x\log 4 - 3\log 4 = x\log 3 + \log 3$

$2x\log 4 - x\log 3 = \log 3 + 3\log 4$

$x(2\log 4 - \log 3) = \log 3 + 3\log 4$

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

Apply the Quadratic Formula

Solve: $2^x - 2^{-x} = 4$

$2^x \times$

$x^2 + 2x^1 + 1x^0$

* multiply ALL terms by 2^x *

$(2^x)^2 - 2^0 = 4(2^x)$

Let $2^x = z$

$(2^x)^2 - 4(2^x) - 2 = 0$

$z^2 - 4z - 2 = 0$

$$z = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{4 \pm \sqrt{(-4)^2 - 4(1)(-2)}}{2(1)}$$

$$= \frac{4 \pm \sqrt{24}}{2}$$

$z = 2 + \sqrt{6}$

$z = 2 - \sqrt{6}$

$\therefore$

$2^x = 2 + \sqrt{6}$ OR $2^x = 2 - \sqrt{6}$

$\log 2^x = \log(2+\sqrt{6})$

$x \log 2 = \log(2+\sqrt{6})$

$2^x > 0$

$\therefore$ Not a solution

$$x = \frac{\log(2+\sqrt{6})}{\log 2}$$

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2 - 6

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2, 3, 4, 6, 7, 9