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

$$(\log(x))^2 = 2\log(x)$$ is quadratic in form

Let $u = \log(x)$

$$u^2 = 2u \qquad ax^2+bx+c=0$$

$$u^2-2u = 0$$

$$u(u-2) = 0$$

$$u=0 \quad \text{OR} \quad u=2$$

$$\log(x)=0 \quad \text{OR} \quad \log(x)=2$$

$$10^{\log(x)} = 10^0 \quad \text{OR} \quad 10^{\log(x)} = 10^2$$

$$x = 1 \quad \text{OR} \quad x = 100$$

$$(\log(1))^2 \stackrel{?}{=} \log(1^2) = 2\log(1)$$

$$0^2 \stackrel{?}{=} 0 \text{ Yep.} \quad = \log(1)$$

Nov 13-10:11 AM

~~$(\log(10))^2 \stackrel{?}{=} \log(10^2)$ log(1) is the power of 10 that 1 is~~

~~$1^2 \stackrel{?}{=} 2\log(10) = 2$~~

~~$\stackrel{?}{=} \log(100) = 2$ $1 = 10^0 \Longrightarrow$ $\log(1) = 0$~~

Should have checked x=100, silly

~~New p.~~

$\boxed{\cancel{x \in \{1\}}}$

$(\log(100))^2 \stackrel{?}{=} \log(100^2)$

$(\log(10^2))^2 = 2\log(100) = \log((10^2)^2)$

$2^2 = 2\log(10^2) = \log(10^4)$

$4 = 2 \cdot 2 = 4 = 4$

So $x \in \{100, 1\}$

$$\log_5(x-4)+\log_5(x+2)=\log_5(7)$$

$$5^{\log_5(x-4)+\log_5(x+2)} = 5^{\log_5(7)}$$

$$\boxed{x-4 + x+2 = 7 \quad \text{standard mistake.}}$$

$$3^2\cdot 3^7 = 3^{2+7} = 3^9$$

$$5^{\log_5(x-4)}\cdot 5^{\log_5(x+2)} = 7 \qquad 3^{2+7} = 3^2\cdot 3^7$$

$$(x-4)(x+2) = 7$$

$$\boxed{x-4=7 \quad \text{OR} \quad x+2=7}$$

Another standard mistake.

only works when it's zero on RHS.

$$x^2-2x-8=7$$

$$x^2-2x-15=0$$

$$(x-5)(x+3)=0$$

$$x=5 \quad \text{OR} \quad x=-3$$

$$\log_5(5-4)+\log_5(5+2)=\log_5(7) \ ?$$

$$0 + \log_5(7) = \quad \text{yeppers.}$$

$$1 = 5^0 \Longleftrightarrow \log_5(1)=0$$

$a^b a^c = a^{b+c}$

$\log_a(b) + \log_a(c)$
$= \log_a(bc)$

$\log_5(x-4) + \log_5(x+2) = \log_5(7)$ $+$

$5^{\log_5((x-4)(x+2))} = 5^{\log_5(7)}$

$(x-4)(x+2) = 7$, etc

Nov 13-10:37 AM

wieligminium-13 has a $\frac{1}{2}$-life of 100 yrs. what's its decay rate?

Build $A = Pe^{kt} = A(t)$

Report what k is.

$$A(100) = Pe^{100k} = \frac{1}{2}P$$

$$e^{100k} = \frac{1}{2}$$

ln(

$$100k = \ln\left(\tfrac{1}{2}\right) = \ln(2^{-1}) = -\ln(2)$$

$$\boxed{k = -\frac{\ln(2)}{100}} = \text{Decay rate.}$$

How old is a sample that decayed from 14 grams to 5 grams? To the nearest Day.

$$14e^{kt} = 5$$

& solve for t. Plug in actual value of k @ the end.

$$e^{kt} = \frac{5}{14}$$

$$kt = \ln\left(\tfrac{5}{14}\right) = \ln(5) - \ln(14)$$

```
-100ln(5/14)/ln(
2)
      148.5426827
```

$$t = \frac{\ln(5/14)}{k} = \frac{\ln(5/14)}{-\frac{\ln(2)}{100}}$$

$$= \boxed{\frac{-100\ln(5/14)}{\ln(2)}} =$$

$\approx$ 148.5426827 years.

$$(.5426827\ \text{years})\left(\frac{365\ \text{days}}{1\ \text{year}}\right)$$

```
-100ln(5/14)/ln(
2)
      148.5426827
Ans-148
       .542682717
Ans*365
      198.0791917
```

≈ 198.0791917

≈ 198 days.

148 yrs, 198 days.

Common Sense Check $\frac{1}{2}$-life is 100 yrs.

t	
0	15
100	7.5
200	3.75
300	

148 yrs, 198 days for 5 grams fits where it should

What's the future value of
\$5,000 invested @ 4% APR, compounded... for 7 years

... monthly?

$$5000\left(1+\frac{.04}{12}\right)^{(12)(7)}$$

... daily?

$$5000\left(1+\frac{.04}{365}\right)^{(365)(7)}$$

... continuously?

$$5000\,e^{(.04)(7)}$$

Nov 13-10:55 AM