# More solving equations

1. $\log 4 + 2\log x = 6$

$\log 4 + \log x^2 = 6$

log form → $\log(4x^2) = 6$ (base 10)

$\frac{10^6}{4} = \frac{4x^2}{4}$

$\frac{10^6}{4} = x^2$

$\pm\sqrt{\frac{10^6}{4}} = x$

$\pm 500 = x$

So $\boxed{x = 500}$

get single log on leftside
What is the base?
go to exponential form

← check answer in ORIGINAL equation.

$\log 4 + 2\log(-500) \stackrel{?}{=} 6$ not possible! so $x \neq -500$

$\log 4 + 2\log 500 = 6$

$6 = 6$ ✓

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

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

$\log\left(\frac{x}{2x^2}\right) = -2$ (base 10)

$10^{-2} = \frac{x}{2x^2}$

$\frac{1}{10^2} = \frac{x}{2x^2}$

$\frac{1}{100} = \frac{x}{2x^2}$

Get single log on left side
What is the base?
Go to exponential form

Cross products are equal

$2x^2 = 100x$

$2x^2 - 100x = 0$

$2x(x - 50) = 0$

$2x = 0$ or $x - 50 = 0$

$x = 0$ or $x = 50$

So $\boxed{x = 50}$

Check answers in ORIGINAL equation!!

not possible $\log(0) = \log(2(0)^2) - 2$ so $x \neq 0$

$\log(50) = \log(2(50)^2) - 2$

$1.698970004 = 3.698970004 - 2$

$1.69897 = 1.6987$ ✓

ANOTHER WAY

replace with $\log_2 2^1$

3. $\log_2(x^2-8x+40)=\log_2(3x-4)+1$

$\log_2(x^2-8x+40)=\log_2(3x-4)+\log_2 2$

$\log_2(x^2-8x+40)=\log_2[2(3x-4)]$

get single log on BOTH sides

Use one-to-one prop. and solve quadratic...

$x^2-8x+40=2(3x-4)$

$x^2-8x+40=6x-8$

$-6x+8 \quad -6x+8$

$x^2-14x+48=0$

$(x-8)(x-6)=0$

$x-8=0$ or $x-6=0$

$x=8$ or $x=6$

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

$\log_{10}[(x-3)(2)]=3$

$10^3=(x-3)2$

$\frac{10^3}{2}=x-3$

$\frac{10^3}{2}+3=x$

$x=503$