Feb 10

Intro to Using Logs

We'll use log = $\log_{10}$ button on calculator, called 'common log'.

Solve for x

ex. $4^{2x} = 15$

Can't rewrite as same base

Instead, we can apply logs to both sides and solve.

$\log(4^{2x}) = \log(15)$

$\frac{2x\log 4}{2\log 4} = \frac{\log(15)}{(2\log(4))}$

$x = 0.976722\ldots$

$x = 0.977$

Can NEVER rewrite as a power of 4

Can only solve by applying logs

Steps:

1) Write log in front of both sides
2) Expand the logs using log laws
3) Solve for x using calculator

ex. $3^{4x-2} = 25$

$\log(3^{4x-2}) = \log(25)$

$(4x-2)\log 3 = \log(25)$

$4x\log 3 - 2\log 3 = \log 25$ (+2log3 to both sides)

$\frac{4x\log 3}{4\log 3} = \frac{(\log 25 + 2\log 3)}{4\log 3}$

$x = 1.232$

ex. $216^{x+1} = 35(8^{3x})$

$\log(216^{x+1}) = \log(35(8^{3x}))$

$(x+1)\log 216 = \log 35 + 3x\log 8$

$x\log 216 + 1\log 216 = \log 35 + 3x\log 8$

$-\log 216 \quad -\log 216$

$-3x\log 8 \quad -3x\log 8$

$x\log 216 - 3x\log 8 = \log 35 - \log 216$

$x(\log 216 - 3\log 8) = (\log 35 - \log 216)$

$\frac{x(\log 216 - 3\log 8)}{(\log 216 - 3\log 8)} = \frac{(\log 35 - \log 216)}{(\log 216 - 3\log 8)}$

$x = 2.109$

TRY $121^{5x+2} = 8^{3x}$

$(5x+2)\log 121 = 3x\log 8$

$5x\log 121 + 2\log 121 = 3x\log 8$

$2\log 121 = 3x\log 8 - 5x\log 121$

$2\log 121 = x(3\log 8 - 5\log 121)$

$\frac{2\log 121}{(3\log 8 - 5\log 121)} = x$

$-0.541 = x$

p. 423
#7, 8a, 12