

1/25/13 Change of Base formula

When you can't match bases, you can take the log of both sides of the equation and use a calculator.

Solve

Ex ①

$$5^t = 10$$
$$\log(5^t) = \log(10)$$
$$\frac{t \log(5)}{\log(5)} = \frac{\log(10)}{\log(5)}$$

$$t = \frac{\log(10)}{\log(5)}$$

②

$$(1.02)^x = 2$$
$$\log((1.02)^x) = \log(2)$$
$$x \frac{\log(1.02)}{\log(1.02)} = \frac{\log(1.02)}{\log(1.02)}$$

$$x = \frac{\log(2)}{\log(1.02)}$$

Ex

③

$$12^{2x} = 1000$$
$$\log(12^{2x}) = \log(1000)$$

$$\log(12^{2x}) = \log(1000)$$

$$\frac{2x \log(12)}{2 \log(12)} = \frac{\log(1000)}{2 \log(12)}$$

$$x = \frac{\log(1000)}{2 \log(12)}$$

Change of Base formula

$$\log_b(a) = \frac{\log_c(a)}{\log_c(b)}$$

Find Each logarithm. Use Base change formula.

Ex

④

$$\log_3(8) = \frac{\log_{10}(8)}{\log_{10}(3)}$$

⑤

$$\log_7(46) = \frac{\log_{10}(46)}{\log_{10}(7)}$$