

Precalculus

Basic exponent equation of type $c^{px+q} = Ad^{rx+s}$

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Example

Solve.

$$3^{2x+5} = 5 \cdot 2^{-x+1}$$

Common base

$$\left(2^{\log_2 3}\right)^{2x+5} = 5 \cdot 2^{-x+1}$$

$$a = b^{\log_b a}$$

$$2^{(\log_2 3)(2x+5)} = 5 \cdot 2^{-x+1}$$

$$\frac{2^{(\log_2 3)(2x+5)}}{2^{-x+1}} = 5$$

$$2^{(\log_2 3)(2x+5)-(-x+1)} = 5$$

Apply \log_2

$$(\log_2 3)(2x + 5) + x - 1 = \log_2 5$$

$$x(2 \log_2 3 + 1) + 5 \log_2 3 = \log_2 5 + 1$$

$$x = \frac{\log_2 5 + 1 - 5 \log_2 3}{2 \log_2 3 + 1}$$

$$x \approx -1.1038$$

Calculator