Solve the equation $3^{x-1} = \frac{2}{4^{x+1}}$, giving your answer in the from $x = \frac{lna}{lnb}$, where a and b are rational numbers.

$$3^{x-1} = \frac{2}{4^{x+1}}$$

Take logs of both sides (**ln**)

$$ln(3^{x-1}) = ln\left(\frac{2}{4^{x+1}}\right)$$

$log\frac{a}{b} = \log a - \log b$

$$ln(3^{x-1}) = ln2 - ln(4^{x+1})$$

$\log a^r = r\log a$

$$(x-1)ln3 = ln2 - (x+1)ln4$$

Multiply out the brackes

$$xln3 - ln3 = ln2 - xln4 - 1ln4$$

Rearrange the equation

$$xln3 + xln4 = ln2 - ln4 + ln3$$

Factorise

$$x(ln3 + ln4) = ln\frac{6}{4}$$

$$x(ln12) = ln\frac{3}{2}$$

$$x = \frac{ln\frac{3}{2}}{ln12}$$