8^4/3=(2^5x-4)/√2 solve for x

Solution

1. If parentheses in the equation have not been omitted then by following the usual rules regarding order of calculations we obtain the linear equation which has the solution:

$$\frac{8^4}{3} = \frac{2^5 x - 4}{\sqrt{2}} \Leftrightarrow \frac{4096\sqrt{2}}{3} = 32x - 4 \Leftrightarrow x = \frac{1024\sqrt{2} + 3}{24}.$$

Answer

$$x = \frac{1024\sqrt{2} + 3}{24}$$

2. If parentheses in the equation have been omitted then the equation must be of the form 8^(4/3)=(2^(5x-4))/√2. So we have the exponential equation:

$$8^{4/3} = \frac{2^{5x-4}}{\sqrt{2}}.$$

We rewrite this equation by multiplying its sides by $\sqrt{2}$:

$$8^{4/3}\sqrt{2} = 2^{5x-4}.$$

We note that $8^{4/3}\sqrt{2} = 2^{\frac{3\cdot4}{3}+\frac{1}{2}} = 2^{4.5}$. Hence we can write each side as a power of the same number:

$$2^{4.5} = 2^{5x-4} \,.$$

Since the bases are the same number, 2, we can use the base–exponent property and set the exponents equal:

$$5x - 4 = 4.5 \Leftrightarrow 5x = 8.5 \Leftrightarrow x = 1.7.$$

Answer

$$x = 1.7$$