Algebra $x^4$

Given:

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

$$x \neq -1$$

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

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

$$3 = (x^2 - 1).(x + 1)^2$$

We see that x = -2 is solution

$$3 = (x^2 - 1)(x^2 + 2x + 1)$$

$$3 = x^4 + 2x^3 - 2x - 1$$

$$x^4 + 2x^3 - 2x - 4 = 0$$

$$x^3(x+2) - 2(x+2) = 0$$

$$(x^3 - 2).(x+2) = 0$$

$x^3 = 2$ $\qquad$ $x + 2 = 0$

$x = \sqrt[3]{2}$ $\qquad$ $x = -2$