

Factor Higher Degree Polynomials

If your degree is even, it is a perfect square. Divide exponent by 2 to find the square root.

$$\sqrt{x^4} = x^2 \quad \sqrt{x^6} = x^3 \quad \sqrt{x^{10}} = x^5$$

Factor completely.

1. $x^4 - 16$ ← Dif. of Squares method

$$(x^2 + 4)(x^2 - 4)$$

$$\sqrt{x^4} = x^2 \quad \sqrt{16} = 4$$

$$(x^2 + 4)(x + 2)(x - 2) \quad \sqrt{x^2} = x \quad \sqrt{4} = 2$$

2. $3x^5 - 2x^3 - 8x$ GCF 1st!

$$x(3x^4 - 2x^2 - 8)$$

$$x(3x^4 - 6x^2 + 4x^2 - 8)$$

$$x[(3x^4 - 6x^2)(x^2 - 2)]$$

$$x[3x^2(x^2 - 2) + 4(x^2 - 2)]$$

$$x(3x^2 + 4)(x^2 - 2)$$

~~24~~
~~-6~~ × 4
~~-2~~

3. $5x^4 - 9x^2 + 4$

$$5x^4 - 5x^2 - 4x^2 + 4$$

$$(5x^4 - 5x^2) + (-4x^2 + 4)$$

$$5x^2(x^2 - 1) - 4(x^2 - 1)$$

$$(5x^2 - 4)(x^2 - 1) \leftarrow \text{Dif. of Squares}$$

$$(5x^2 - 4)(x + 1)(x - 1)$$

~~mult~~
~~20~~
~~-5~~ × -4
~~-9~~