

Factoring and Solving Quartic Polynomials

Name:

Key

Date:

Factor

1. $x^4 - x^2 - 72 = 0$

$$\frac{(x^2 - 9)(x^2 + 8)}{(x-3)(x+3)(x^2+8)}$$

3. $9x^4 - 25 = 0$

$$\boxed{(3x^2 - 5)(3x^2 + 5)}$$

5. $x^4 - 27x = 0$

$$\frac{x(x^3 - 27) = 0}{x(x-3)(x^2+3x+9)}$$

7. $7x^4 = -28x^2 - 21$

$$\frac{7(x^4 + 4x^2 + 3)}{7(x^2+3)(x^2+1)}$$

9. $x^4 - x^2 = 12$

$$\frac{x^4 - x^2 - 12 = 0}{(x^2 - 4)(x^2 + 3)} \\ \boxed{(x-2)(x+2)(x^2+3)}$$

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

$$\frac{x^4 + 5x^2 + 4}{(x^2+1)(x^2+4)}$$

4. $x^4 + 9x^2 = -20$

$$\frac{x^4 + 9x^2 + 20}{(x^2+5)(x^2+4)}$$

6. $x^4 - 7x^2 - 8 = 0$

$$\boxed{(x^2 - 8)(x^2 + 1)}$$

8. $x^4 - 5x^2 - 24 = 0$

$$\boxed{(x^2 - 8)(x^2 + 3)}$$

10. $x^4 - 7x^2 = -12$

$$\frac{x^4 - 7x^2 + 12 = 0}{(x^2 - 3)(x^2 - 4)} \\ \boxed{(x^2 - 3)(x-2)(x+2)}$$

Solve each polynomial

1. $x^4 - x^2 - 72 = 0$

$x = 3$

$x = -3$

$x = \pm i\sqrt{8}$

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

$x = \pm 2i$

$x = \pm i$

3. $9x^4 - 25 = 0$

$3x^2 - 5 = 0$

$x^2 = \frac{\sqrt{5}}{\sqrt{3}} \Rightarrow x = \pm \frac{\sqrt{15}}{3}$

$3x^2 + 5 = 0$

$x^2 = -\frac{5}{3} \Rightarrow x = \pm \frac{i\sqrt{15}}{3}$

5. $x^4 - 27x = 0$

$x(x^3 - 27)$

$x(x-3)(x^2+3x+9)$

$x = 0$

$x = \frac{-3 \pm \sqrt{9 - 4(1)(9)}}{2}$

$x = 3$

$x = \frac{-3 \pm \sqrt{-27}}{2}$

$x = \frac{-3 \pm 3i\sqrt{3}}{2}$

7. $7x^4 = -28x^2 - 21$

$x = \pm i\sqrt{3}$

$x = \pm i$

4. $x^4 + 9x^2 = -20$

$x = \pm 2i$

$x = \pm i\sqrt{5}$

6. $x^4 - 7x^2 - 8 = 0$

$x = \pm 2\sqrt{2}$

$x = \pm i$

8. $x^4 - 5x^2 - 24 = 0$

$x = \pm 2\sqrt{2}$

$x = \pm i\sqrt{3}$

9. $x^4 - x^2 = 12$

$x = 2$

$x = -2$

$x = \pm i\sqrt{3}$

10. $x^4 - 7x^2 = -12$

$x = 2$

$x = -2$

$x = \pm \sqrt{3}$