

Algebra 2.5 Other Types of Equations

Absolute Value Equations

EX. $|x| = 4$ $(x = 4, -4)$

EX. $2|x-4| - 12 = 0$

$$2|x-4| = 12$$

$$|x-4| = 6$$



$$x-4 = 6 \quad x-4 = -6$$

$$(x = 10) \quad (x = -2)$$

EX. $|3x-8| = -3$ Can't have a negative w/ absolute value, no solution \emptyset

Grouping

EX. $7x^3 - 14x^2 - 5x + 10 = 0$

$$7x^2(x-2) - 5(x-2) = 0$$

$$(7x^2 - 5)(x-2) = 0$$

$$x = \pm \sqrt{\frac{5}{7}} = \pm \frac{\sqrt{35}}{7} \quad (x = 2)$$

Rational Exponents

EX. $y^{3/2} = 5y$

$$y^{3/2} - 5y = 0$$

$$y(y^{1/2} - 5) = 0$$

$$(y = 0) \quad y^{1/2} - 5 = 0 \quad (y = 25)$$

EX. $x^{3/2} = 27$

$$(x^{3/2})^{2/3} = (27)^{2/3} \quad (\text{raise both sides by the reciprocal of the value})$$

$$x^{1/1} = (\sqrt[3]{27})^2$$

$$x = 3^2$$

$$x = 9$$

EX. $y^{3/4} = 16$

$$(y^{3/4})^{4/3} = (16)^{4/3}$$

$$y^{1/2} = (\sqrt[3]{16})^4$$

$$y = (\sqrt[3]{16})^8$$

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Radical Equations

$$\sqrt{7-x} = x-5$$

$$7-x = (x-5)^2$$

$$7-x = x^2 - 10x + 25$$

$$0 = x^2 - 9x + 18$$

$$0 = (x-6)(x-3)$$

$x=6, 3$ must check answers $x=6$

$$\sqrt{7-6} = 6-5$$

$$\sqrt{1} = 1 \checkmark$$

$$\sqrt{7-3} = 3-5$$

$$\sqrt{4} = -2$$

$$2 \neq -2$$

$$\sqrt[3]{7x-4} - 2 = 0$$

$$\sqrt[3]{7x-4} = 2$$

$$7x-4 = 8$$

$$7x = 12$$

$$x = \frac{12}{7}$$

$$\sqrt[3]{7\left(\frac{12}{7}\right)-4} - 2 = 0$$

$$\sqrt[3]{12-4} - 2 = 0$$

$$\sqrt[3]{8} - 2 = 0$$

$$2 - 2 = 0 \checkmark$$

Quadratic like Equations

$$\text{EX. } x^4 - 25x^2 + 144 = 0$$

$$(x^2-16)(x^2-9) = 0$$

$$(x+4)(x-4)(x+3)(x-3) = 0 \quad x=4, -4, 3, -3$$

$$\text{EX } 6w - 23w^{\frac{1}{2}} + 20 = 0 \quad \text{let } w^{\frac{1}{2}} = x \quad x^2 = w$$

$$6x^2 - 23x + 20 = 0$$

$$(3x-4)(2x-5) = 0$$

$$3x=4 \quad 2x=5$$

$$x = \frac{4}{3} \quad x = \frac{5}{2} \Rightarrow w = \frac{16}{9}, \frac{25}{4}$$

Algebra 2.5

Difference of Two Cubes

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Sum of Two Cubes

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

EX Factor $8x^3 - 27$

$$a = 2x \quad b = 3$$

$$(2x - 3)(4x^2 + 6x + 9)$$