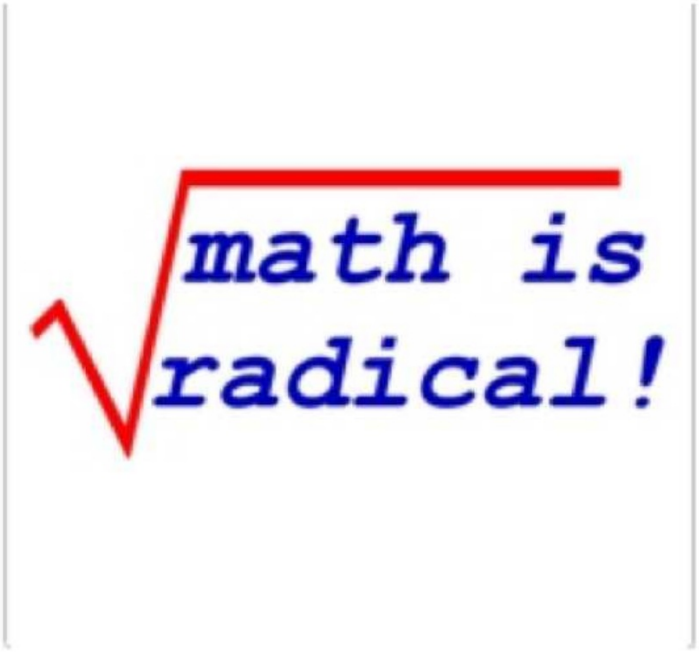
1.5 Solving Quadratic Equations Using Square Roots



Solving Quadratics By Taking Square Roots

*Use solving by taking square roots when...

the only variable expressions are either x^2 *or* $(x \pm c)^2$

Examples:

$x^2 + 8 = 21$ $\quad$ $3(x-1)^2 - 5 = 19$

ex: Solve.

a) $3x^2 + 5 = 41$

$3x^2 = 36$

$\sqrt{x^2} = \sqrt{12}$

$|x| = 2\sqrt{3}$

$x = \pm 2\sqrt{3}$

$\sqrt{x^2} = |x|$

$x = -4$

$\sqrt{(-4)^2}$

$\sqrt{16}$

4

b) $4(x-2)^2+32=0$

$\sqrt{(x-2)^2}=\sqrt{-8}$

$|x-2|=2i\sqrt{2}$

~~$2\pm 2i\sqrt{2}$~~

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

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

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c) $3x^2 - 1 = 0$

$\sqrt{x^2} = \sqrt{\frac{1}{3}}$

$|x| = \sqrt{\frac{1}{3}}$

$x = \pm \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

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

d.) $3x^2 + 7 = 7$

$x^2 = 0$

$x = 0$, mult. of 2

e.) $4(x+3)^2 + 1 = 49$

$\sqrt{(x+3)^2} = \sqrt{12}$

$|x+3| = 2\sqrt{3}$

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

f.) $3(x-4)^2 + 14 = 5$

$\sqrt{(x-4)^2} = \sqrt{-3}$

$|x-4| = i\sqrt{3}$

$x = 4 \pm i\sqrt{3}$

c) $3x^2 - 1 = 0$

$\sqrt{x^2} = \sqrt{\frac{1}{3}}$

$|x| = \frac{\sqrt{3}}{3}$

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

d.) $3x^2 + 7 = 7$

$x^2 = 0$

$|x| = 0$

$x = 0$, mult. of 2

e.) $4(x+3)^2 + 1 = 49$

f.) $3(x-4)^2 + 14 = 5$

Solve by completing the square (CTS).

1.) $x^2 - 6x + 11 = 0$

$x^2 - 6x + 9 + -9 + 11 = 0$

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

$\sqrt{(x-3)^2} = \sqrt{-2}$

$|x-3| = i\sqrt{2}$

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

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

2.) $3x^2 - 12x + 5 = 0$

$3(x^2 - 4x + 4) - 12 + 5 = 0$

$3(x-2)^2 = 7$

$\sqrt{(x-2)^2} = \pm\sqrt{\frac{7}{3}}$

$|x-2| = \frac{\sqrt{21}}{3}$

$x = 2 \pm \frac{\sqrt{21}}{3}$

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