

HW A18 pg. 149 # 21-28, 31-36,
38-43

9.2 | 9.3 Quadratic Formula and Solutions of Quadratics Quadratic Formula

ALWAYS WORKS! Can do it instead of factoring, taking square roots, or completing the square.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

make sure you have $ax^2 + bx + c = 0$.

Ex #1 $2x^2 - 5x + 3 = 0$.

$$x = \frac{5 \pm \sqrt{(-5)^2 - 4(2)(3)}}{2(2)}$$
$$x = \frac{5 \pm \sqrt{25 - 24}}{4}$$

$$x = \frac{5 \pm \sqrt{1}}{4}$$

$$x = \frac{5 \pm 1}{4} \quad \begin{aligned} \frac{5+1}{4} &= \frac{6}{4} = \boxed{\frac{3}{2}} \\ \frac{5-1}{4} &= \frac{4}{4} = \boxed{1} \end{aligned}$$

Ex #2 $2x^2 + 4x - 5 = 0$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(2)(-5)}}{2(2)}$$

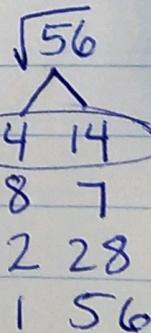
$$x = \frac{-4 \pm \sqrt{16 + 40}}{4}$$

$$x = \frac{-4 \pm \sqrt{56}}{4}$$

$$x = \frac{-4 \pm \sqrt{4 \cdot 14}}{4}$$

$$x = \frac{-4 \pm 2\sqrt{14}}{4}$$

$$\Rightarrow \boxed{x = \frac{-2 \pm \sqrt{14}}{2}}$$



$$\text{Ex\#3 } x^2 - 9x + 1 = 0$$
$$x = \frac{9 \pm \sqrt{9^2 - 4(1)(1)}}{2(1)}$$

$$x = \frac{9 \pm \sqrt{81 - 4}}{2}$$

$$\sqrt{77} \\ 7 \uparrow 11$$

$$\boxed{x = \frac{9 \pm \sqrt{77}}{2}}$$

$$\text{Ex\#4 } 2x^2 - 5x - 3 = 0$$
$$x = \frac{5 \pm \sqrt{(-5)^2 - 4(2)(-3)}}{2(2)}$$

$$x = \frac{5 \pm \sqrt{25 + 24}}{4} = 49$$

$$x = \frac{5 \pm \sqrt{49}}{4}$$

$$\frac{5+7}{4} = \frac{12}{4} = \boxed{3}$$

$$x = \frac{5 \pm 7}{4} \quad \begin{array}{l} \swarrow \\ \frac{5-7}{4} = \frac{-2}{4} = \boxed{-\frac{1}{2}} \end{array}$$

$$\text{Ex\#5 } x^2 + 6x + 9 = 0$$
$$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(9)}}{2(1)}$$

$$x = \frac{-6 \pm \sqrt{36 - 36}}{2}$$

$$x = \frac{-6 \pm \sqrt{0}}{2}$$

$$x = \frac{-6}{2}$$

$$\boxed{x = -3}$$

$$\text{EX #6 } 8x^2 + 5x + 6 = 0$$

$$x = \frac{-5 \pm \sqrt{(5)^2 - 4(8)(6)}}{2(8)}$$

$$x = \frac{-5 \pm \sqrt{25 + 96 - 167}}{16}$$

$$x = \frac{-5 \pm \sqrt{-167}}{16}$$

$$x = \frac{-5 \pm i\sqrt{167}}{16}$$

Types of Solutions

Real	Imaginary
-2	$-\frac{1}{2} + i$
$\frac{3}{4}$	$3i$
1.5	$i\sqrt{5}$
$-5 - \sqrt{57}$	$2 - 7i$
$\sqrt{3}$	$-\frac{2}{3}i$

Rational	Irrational
-2	$-5 - \sqrt{57}$
$\frac{3}{4}$	$\sqrt{3}$
1.5	(**)

no imaginary

Discriminant

It's the $b^2 - 4ac$ part of the quadratic formula.

$b^2 - 4ac$	types of solutions
negative	two imaginary solutions (#6)
zero	one real solution (#5)
positive & a perfect square	two real & rational solutions (#1, #4)
positive & not a perfect square	two real & irrational solutions (#2, #3)