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

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

$$x = \frac{5 \pm \sqrt{\cancel{25 - 24}\ 1}}{4}$$

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

$$x = \frac{5 \pm 1}{4} \quad \frac{5+1}{4} = \frac{6}{4} = \boxed{\frac{3}{2}} \qquad \frac{5-1}{4} = \frac{4}{4} = \boxed{1}$$

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

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

$$x = \frac{-4 \pm \sqrt{\cancel{16 + 40}\ 56}}{4}$$

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

$\sqrt{56}$

4 14

8 7

2 28

1 56

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

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

Ex#3 $x^2-9x+1=0$

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

$$x=\frac{9\pm\sqrt{\cancel{81-4}\ 77}}{2}$$

$\sqrt{77}$

7 11

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

Ex#4 $2x^2-5x-3=0$

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

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

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

$$x=\frac{5\pm7}{4}$$

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

$$\frac{5-7}{4}=\frac{-2}{4}=\boxed{-\frac{1}{2}}$$

Ex#5 $x^2+6x+9=0$

$$x=\frac{-6\pm\sqrt{6^2-4(1)(9)}}{2(1)}$$

$$x=\frac{-6\pm\sqrt{\cancel{36-36}\ 0}}{2}$$

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

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

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

Ex #6 $8x^2+5x+6=0$

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

$$x=\frac{-5\pm\sqrt{\cancel{25+192}\;-167}}{16}$$

$$\begin{array}{c}167\\ \wedge \\ 1 \quad 167\end{array}$$

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

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

Types of Solutions

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

Rational	Irrational
-2	$-5-\sqrt{57}$
$3/4$	$\sqrt{3}$
1.5	$(\cancel{\pi})$

$\left.\begin{array}{l}-5-\sqrt{57}\\ \sqrt{3}\end{array}\right\}$ sq roots

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)