

1.4 Quadratic Equations

Day 1 (1)

$$ax^2 + bx + c = 0 \quad \text{standard form}$$

2nd-degree equation

Zero-factor Property

$$a \cdot b = 0 \quad a \text{ and/or } b = 0$$

Ex 1 Solve $6x^2 + 7x = 3$

↳ what is x equal to

$$6x^2 + 7x = 3$$

$$\begin{array}{r} 6x^2 + 7x - 3 = 0 \\ -3 \quad -3 \end{array}$$

$$\begin{array}{l} 6x^2 + 9x - 2x - 3 = 0 \\ \frac{6x^2}{3x} + \frac{9x}{3x} - \frac{2x}{-1} - \frac{3}{-1} = 0 \end{array}$$

No GCF

$$\begin{array}{r} -18 \quad 7 \\ \hline 9(-2) \quad 9(-1) = 7 \end{array}$$

$$3x(2x+3) - 1(2x+3) = 0$$

$$(2x+3)(3x-1) = 0$$

$$\begin{array}{r} 2x+3=0 \\ -3 \quad -3 \end{array}$$

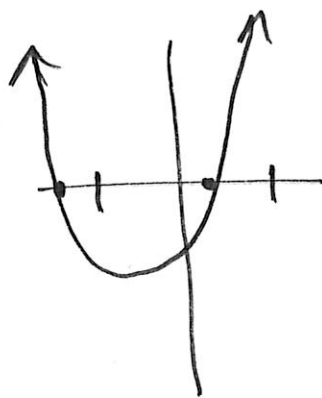
$$\begin{array}{r} 3x-1=0 \\ +1 \quad +1 \end{array}$$

$$\frac{2x}{2} = \frac{-3}{2}$$

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

$$\boxed{x = -\frac{3}{2}}$$

$$\boxed{x = \frac{1}{3}}$$

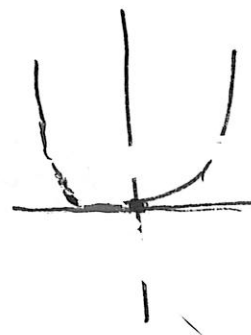


Square Root Property

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

$$x = \pm \sqrt{k} \quad \text{May involve } i$$

$$x = 0 \quad \text{double solution}$$

**Ex 2**

a) $\sqrt{x^2} = \sqrt{17}$

$$x = \pm \sqrt{17}$$

b) $\sqrt{x^2} = \sqrt{-25}$

$$x = \pm 5i$$

c) $\sqrt{(x-4)^2} = \sqrt{12}$

$$x - 4 = \pm \sqrt{12} = \pm 2\sqrt{3}$$

+4

 $\begin{matrix} \wedge \\ 4 \end{matrix}$

+4

 $\begin{matrix} \triangle \\ 23 \end{matrix}$

$$x = 4 \pm 2\sqrt{3}$$

$$x = 4 + 2\sqrt{3}, \quad 4 - 2\sqrt{3}$$

1.4

Completing the Square

(3)

Ex 3

$$x^2 - 4x - 14 = 0 \quad (2)$$

$$\begin{array}{r} +14 \quad +14 \\ \hline \end{array}$$

$$x^2 - 4x + 4 = 14 + 4$$

$$\begin{aligned} -\frac{4}{2} &= (-2)^2 \\ &= 4 \end{aligned}$$

$$\sqrt{(x-2)^2} = \sqrt{18}$$

$$x-2 = \pm \sqrt{18}$$

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

$$\begin{array}{r} +2 \quad +2 \\ \hline \end{array}$$

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

$$\sqrt{18} = 3\sqrt{2}$$

$$\begin{array}{c} \textcircled{2} \uparrow 9 \\ \textcircled{3} \uparrow 3 \end{array}$$

41
(42)**Ex 4**

$$a \neq 1$$

or, use quadratic formula

$$9x^2 - 12x + 9 = 0 \quad (1)$$

$$\frac{9x^2}{9} - \frac{12x}{9} + \frac{9}{9} = \frac{0}{9}$$

$$x^2 - \frac{4}{3}x + 1 = 0 \quad (2)$$

$$\begin{array}{r} -1 \quad +\frac{4}{9} \\ \hline \end{array}$$

$$x^2 - \frac{4}{3}x + \frac{4}{9} = -1 + \frac{4}{9}$$

$$\sqrt{\left(x - \frac{2}{3}\right)^2} = \sqrt{-\frac{5}{9}}$$

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

$$\begin{array}{r} +\frac{2}{3} \quad +\frac{2}{3} \\ \hline \end{array}$$

$$x = \frac{2}{3} \pm i \frac{\sqrt{5}}{3}$$

$$-\frac{9}{9} + \frac{4}{9} = -\frac{5}{9}$$

$$\begin{aligned} \left(\frac{-4}{3}\right)\left(\frac{1}{2}\right) \\ \left(\frac{-4}{6}\right)^2 = \frac{16}{36} \\ \frac{4}{9} \end{aligned}$$