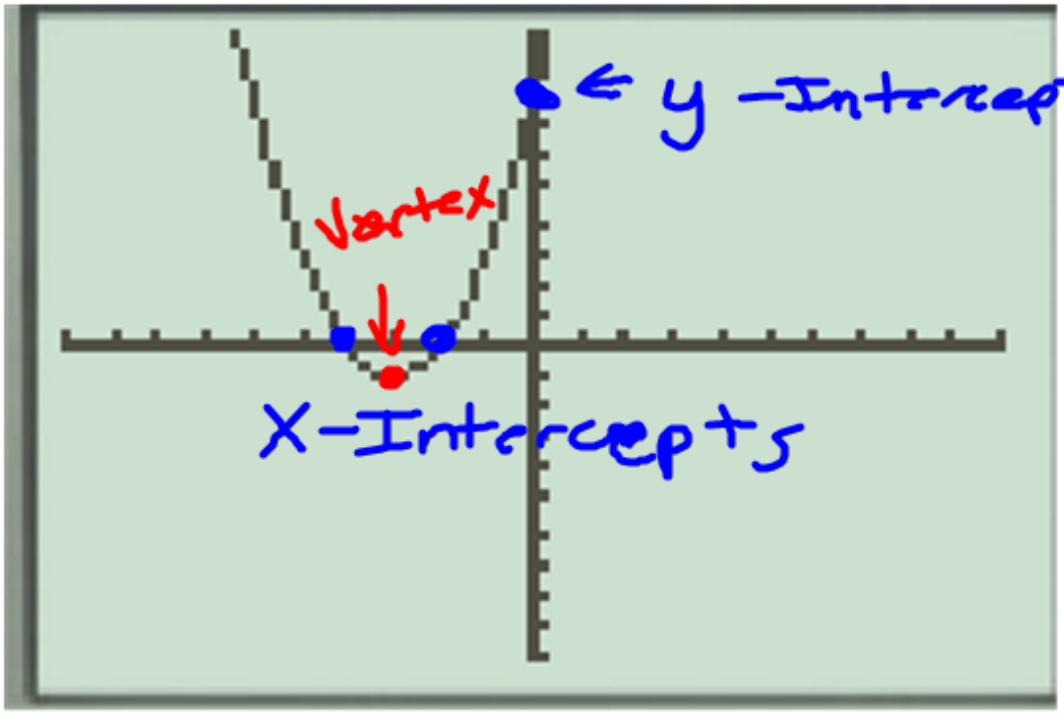
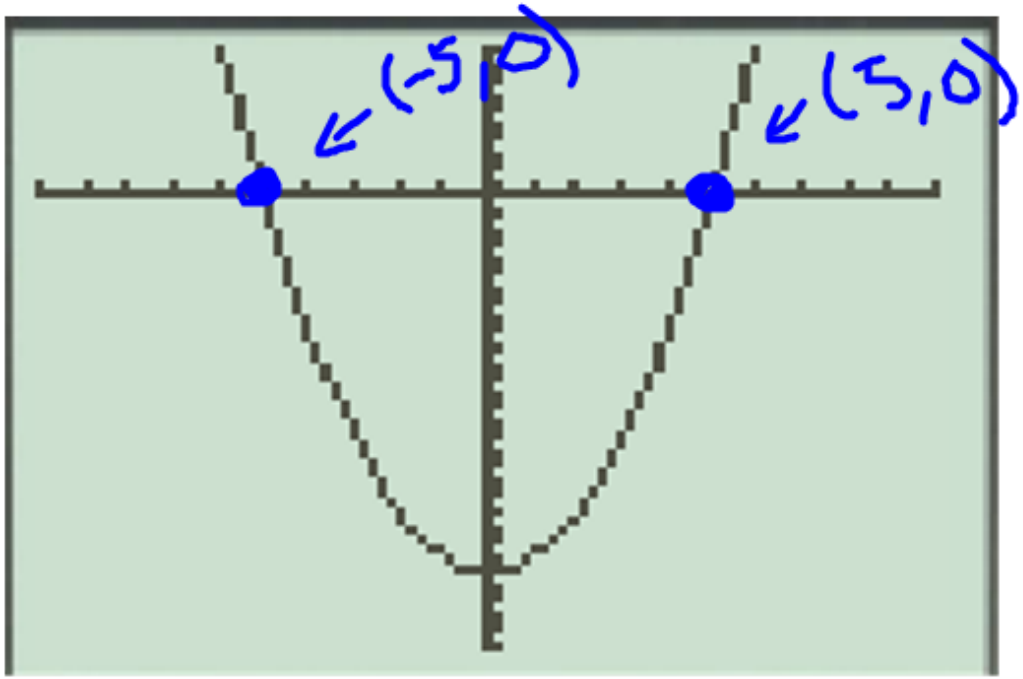
Quadratic Equations

$$f(x) = ax^2 + bx + c \qquad a \neq 0$$

$x^2 + 6x + 8$



graph $f(x) = x^2 - 25$



Solve

$x^2 - 25 = 0$

$+25 \quad +25$

$\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

$x = \sqrt{25} \rightarrow x = 5$

$$x^2 - 25 = 0$$

$-25 = -5 \cdot 5$

$0 = -5 + 5$

factor $(x-5)(x+5)=0$

$x-5=0$ $\qquad$ $x+5=0$

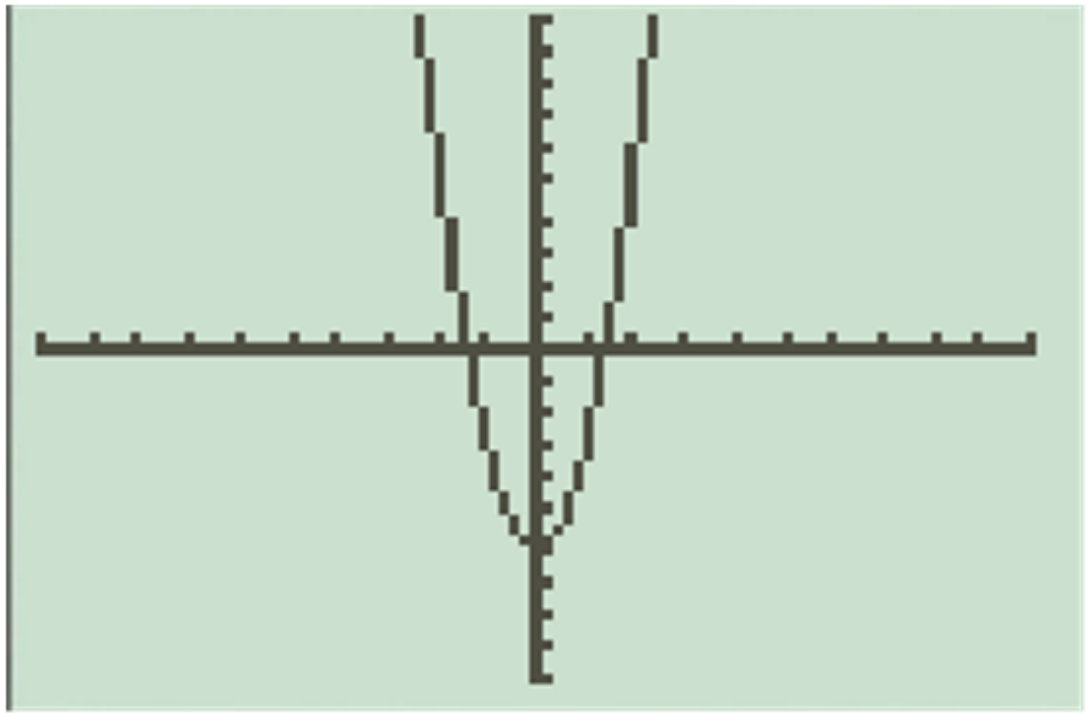
$x=5$ $\qquad$ $x=-5$

$$\frac{3x^2}{3} = \frac{6}{3}$$

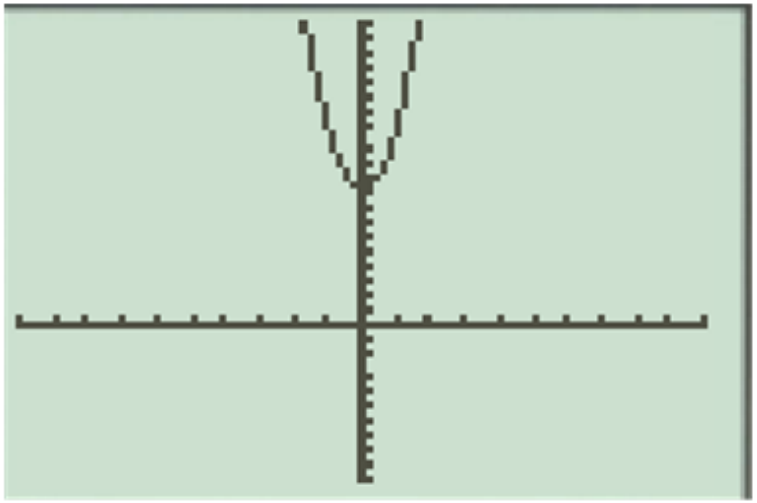
$$\sqrt{x^2} = \sqrt{2}$$

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

Graph $3x^2 - 6$



Graph $f(x) = 4x^2 + 9$



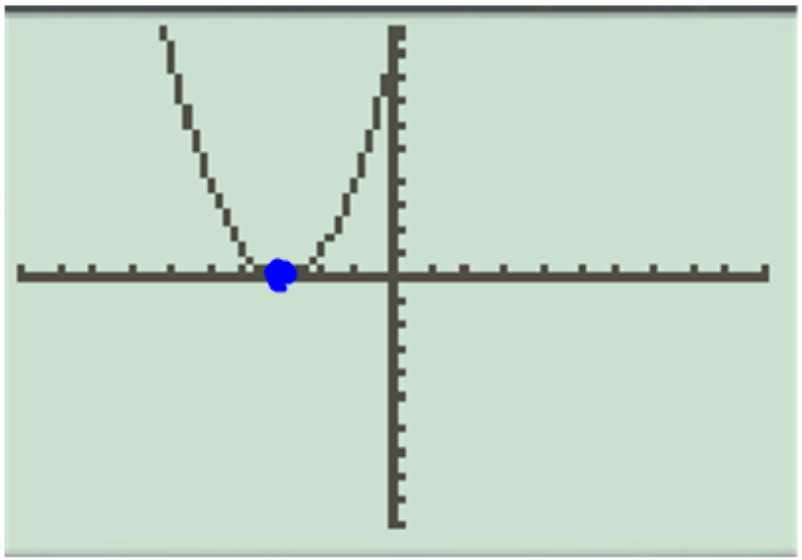
$0 = 4x^2 + 9$

$-9 = 4x^2$

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

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

graph $f(x) = x^2 + 6x + 9$



factor $x^2+6x+9=0$

$(x+3)(x+3)=0$

$x+3=0 \quad x+3=0$

$x=-3$

$x^2+6x+9=2$

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

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

$-3 \quad -3$

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

Solve $x^2+6x+4=0$

$x^2+6x+9 = -4+9$

$\sqrt{(x+3)^2} = \sqrt{5}$

$x+3 = \pm\sqrt{5}$

$x = -3 \pm \sqrt{5}$

$$x^2 + 14x + \underline{49} = (x + \underline{7})^2$$

$$\frac{b}{2} = \frac{14}{2} = 7^2 = 49$$

$$x^2 - 5x + \underline{25/4} = (x + \underline{-5/2})^2$$

$$\left(\frac{-5}{2}\right)^2 = \frac{25}{4}$$

$x^2 - 8x - 7 = 0$

$\frac{-8}{2} = -4^2 = 16$

$x^2 - 8x + 16 = 7 + 16$

$\sqrt{(x-4)^2} = \sqrt{23}$

$x - 4 = \pm\sqrt{23}$

$x = 4 \pm \sqrt{23}$

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

$\left(\frac{5}{2}\right)^2=\frac{25}{4}$

$x^2+5x+\frac{25}{4}=3+\frac{25}{4}$

$3=\frac{12}{4}$

$\sqrt{(x+\frac{5}{2})^2}=\sqrt{\frac{37}{4}}$

$x+\frac{5}{2}=\pm\frac{\sqrt{37}}{2}$

$x=-\frac{5}{2}\pm\frac{\sqrt{37}}{2}$

The Quadratic Formula

ax^2+bx+c format

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

Solve $\overset{a}{5}x^2 + \overset{b}{8}x + \overset{c}{3} = 0$

$b^2 - 4ac$

$(8)^2 - 4(5)(3)$

$64 - 60$

$\sqrt{4}$

± 2

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

$$x = \frac{-(8) \pm 2}{2(5)} = \frac{-8 \pm 2}{10}$$

$$x = \frac{-8+2}{10} = \frac{-6}{10} = \frac{-3}{5}$$

$$x = \frac{-8-2}{10} = \frac{-10}{10} = -1$$

Solve $3x^2 - 6x = 4$

$3x^2 - 6x - 4 = 0$

$a \quad b \quad c$

$b^2 - 4ac$

$(-6)^2 - 4(3)(-4)$

$36 + 48$

$\sqrt{84} = 2\sqrt{21}$

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

$$x = \frac{-(-6) \pm 2\sqrt{21}}{2(3)}$$

$$x = \frac{6 \pm 2\sqrt{21}}{6} = \frac{3 \pm \sqrt{21}}{3}$$

$$x = 1 \pm \frac{\sqrt{21}}{3}$$