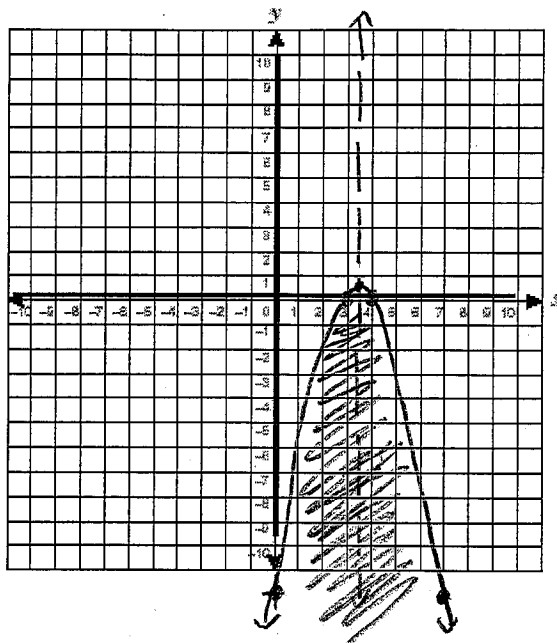


Advanced Algebra
Graphing Quadratic Inequalities - 2 Variables

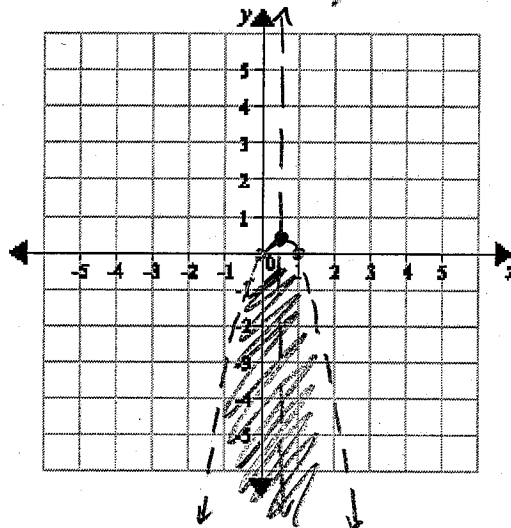
Name Key hr

Graph each quadratic inequality and the axis of symmetry. Write coordinates for all necessary steps.

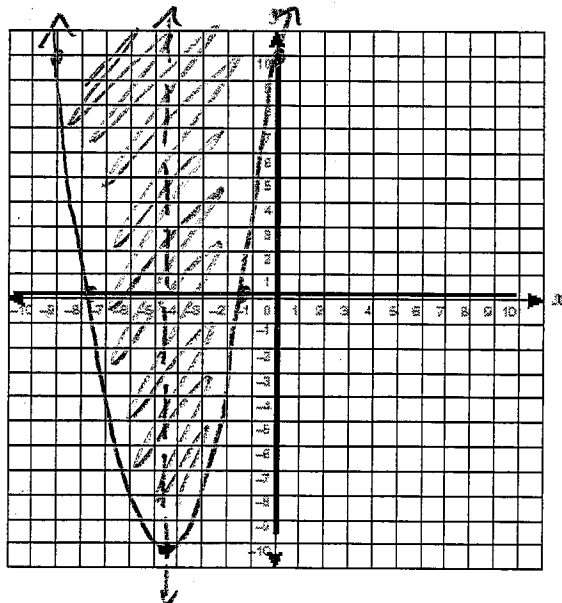
1. $y \leq -x^2 + 7x - 12$
 $x = \frac{-7}{2(-1)} = \frac{-7}{-2} = 3.5$
 Opens: down
 AOS: $x = 3.5$
 Vertex: $(3.5, 2.5)$
 $y = -(3.5)^2 + 7(3.5) - 12$
 $y = .25$
 $-1(0 = -x^2 + 7x - 12) - 1$
 $0 = x^2 - 7x + 12$
 $0 = (x-4)(x-3)$
 $x = 4 \quad x = 3$
 x-intercepts: $(3, 0)(4, 0)$
 y-intercept: $(0, -12)$
 pt of reflection: $(7, -12)$
 $y = -(6)^2 + 7(6) - 12$
 $y = -12$



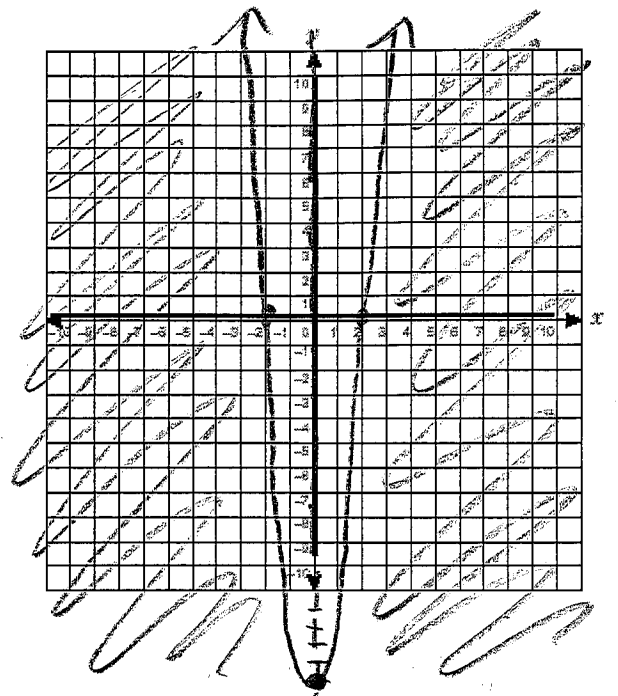
2. $y < -x^2 + x$
 $x = \frac{-1}{2(-1)} = \frac{-1}{-2} = \frac{1}{2}$
 Opens: down
 AOS: $x = \frac{1}{2}$
 Vertex: $(\frac{1}{2}, \frac{1}{4})$
 $-1(0 = -x^2 + x) - 1$
 $0 = x^2 - x$
 $0 = x(x-1)$
 $x = 0 \quad x = 1$
 x-intercepts: $(0, 0)(1, 0)$
 y-intercept: $(0, 0)$
 pt of reflection: $(1, 0)$
 $y = -(0)^2 + 0$
 $y = 0$



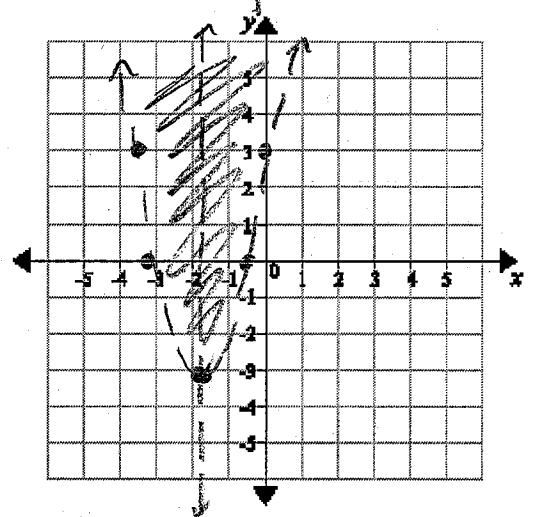
3. $y \geq x^2 + 9x + 10$
 $x = \frac{-9}{2(1)} = \frac{-9}{2} = -4.5$
 Opens: up
 AOS: $x = -4.5$
 Vertex: $(-4.5, -10.25)$
 $y = (-4.5)^2 + 9(-4.5) + 10$
 $y = -10.25$
 $x = \frac{-9 \pm \sqrt{9^2 - 4(1)(10)}}{2(1)}$
 $x = \frac{-9 \pm \sqrt{81 - 40}}{2}$
 $x = \frac{-9 \pm \sqrt{41}}{2} = \frac{-9 \pm 6.4}{2}$
 $x = -7.7, -1.3$
 x-intercepts: $(-7.7, 0)(-1.3, 0)$
 y-intercept: $(0, 10)$
 pt of reflection: $(-9, 10)$
 $y = 0^2 + 9(0) + 10$
 $y = 10$



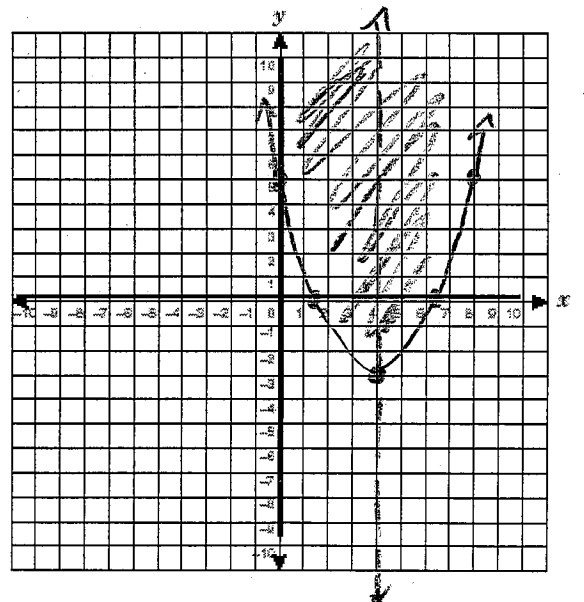
4. $y \leq 4x^2 - 16$ $x = \frac{0}{2(4)} = 0$
 Opens: UP $y = 4(0)^2 - 16$
 $y = -16$
 AOS: $x = 0$ $0 = 4x^2 - 16$
 $16 = 4x^2$
 $4 = x^2$
 $x = \pm 2$
 Vertex: $(0, -16)$
 x-intercepts: $(2, 0)(-2, 0)$
 y-intercept: $(0, -16)$ $y = 4(0)^2 - 16$
 $y = -16$
 pt of reflection: none



5. $y > 2x^2 + 7x + 3$ $x = \frac{-7}{2(2)} = -1.75$
 Opens: UP $y = 2(-1.75)^2 + 7(-1.75) + 3$
 $y = -3.125$
 AOS: $x = -1.75$ $0 = 2x^2 + 7x + 3$
 $0 = (2x+1)(x+3)$
 $x = -1/2 \quad x = -3$
 Vertex: $(-1.75, -3.125)$
 x-intercepts: $(-1/2, 0)(-3, 0)$
 y-intercept: $(0, 3)$ $y = 2(0)^2 + 7(0) + 3$
 $y = 3$
 pt of reflection: $(-3.5, 3)$



6. $y \geq \frac{1}{2}(x-4)^2 - 3$ $0 = \frac{1}{2}(x-4)^2 - 3$
 $3 = \frac{1}{2}(x-4)^2$
 $6 = (x-4)^2$
 $\pm 2.4 = x-4$
 $4 \pm 2.4 = x$
 $x = 6.4, 1.6$
 Opens: UP
 AOS: $x = 4$
 Vertex: $(4, -3)$
 x-intercepts: $(6.4, 0)(1.6, 0)$ $y = \frac{1}{2}(6.4-4)^2 - 3$
 $y = \frac{1}{2}(-4)^2 - 3$
 $y = \frac{1}{2}(16) - 3$
 $y = 8 - 3$
 $y = 5$
 y-intercept: $(0, 5)$
 pt of reflection: $(8, 5)$



7. $y > -(x+3)^2 + 9$

Opens: down

AOS: $x = -3$

Vertex: $(-3, 9)$

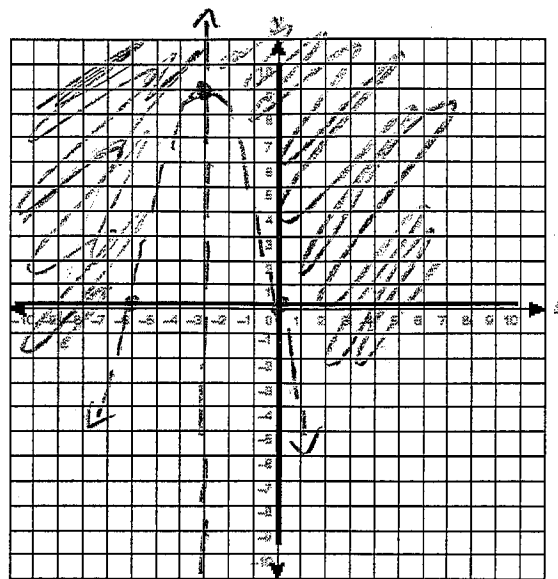
x-intercepts: $(-6, 0)$ $(0, 0)$

y-intercept: $(0, 0)$

pt of reflection: $(-6, 0)$

$$\begin{aligned} 0 &= -(x+3)^2 + 9 \\ -9 &= -(x+3)^2 \\ 9 &= (x+3)^2 \\ \pm 3 &= x+3 \\ -3 \pm 3 &= x \\ x &= -6, 0 \end{aligned}$$

$$\begin{aligned} y &= -(0+3)^2 + 9 \\ y &= -(3)^2 + 9 \\ y &= -9 + 9 \\ y &= 0 \end{aligned}$$



8. $y < 3(x-1)^2 + 3$

Opens: up

AOS: $x = 1$

Vertex: $(1, 3)$

x-intercepts: none

y-intercept: $(0, 6)$

pt of reflection: $(2, 6)$

$$\begin{aligned} 0 &= 3(x-1)^2 + 3 \\ -3 &= 3(x-1)^2 \\ -1 &= (x-1)^2 \\ \pm i &= x-1 \end{aligned}$$

$$\begin{aligned} 1 \pm i &= x \\ y &= 3(0-1)^2 + 3 \\ y &= 3(-1)^2 + 3 \\ y &= 3 \cdot 1 + 3 \\ y &= 3 + 3 \\ y &= 6 \end{aligned}$$

