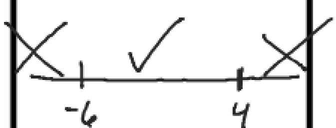
Graphing Quadratic Inequalities

1. **Graph the Curve**
2. **Dotted/Solid**
3. **Shade**



$(-8)^2+2(-8)-24$

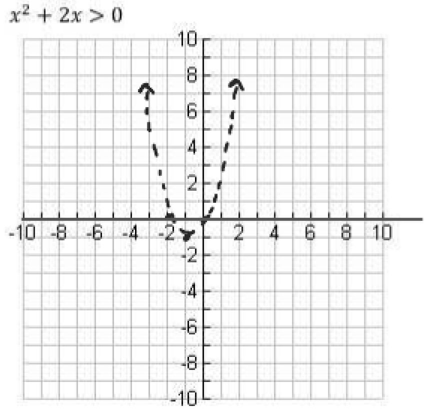
$64-16-24$

$(10)^2-2(10)-24$

$100-20-24$

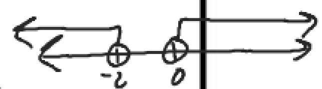
6. For each inequality:
   - Graph each inequality
   - Record the solution using symbols, interval notation, and a number line graph.

a. $x^2+2x>0$

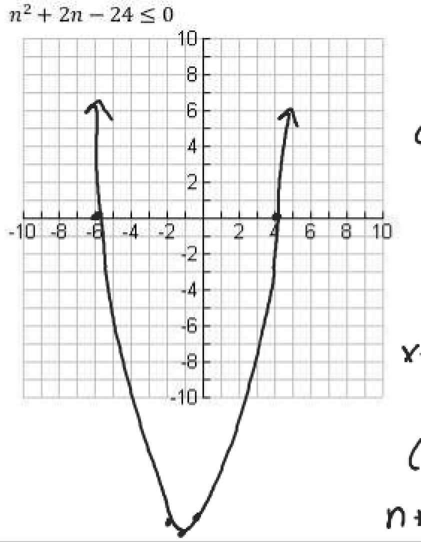


$x<-2$ or $x>0$

$(-\infty,-2)\cup(0,\infty)$



b. $n^2+2n-24\le 0$



open up

$x=-\frac{b}{2a}=\frac{-2}{2(1)}=-1$

$(-1)^2+2(-1)-24$

$1-2-24$

-25

$v(-1,-25)$

x-intercepts

$n^2+2n-24=0$

$(n+6)(n-4)=0$

$n+6=0 \quad n-4=0$

$n=-6 \quad n=4$

$-6\le n\le 4$

$[-6,4]$

Opens down

$8r-r^2-15 \ge 0$

$-r^2+8r-15 \ge 0$

$a=-1 \quad b=8 \quad c=-15$

✗ ✓ ✓

3 5

$-(6)^2+8(6)-15$

$-36+48-15$

✓ ✗ ✓

-2 3

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

$-16-4+6$

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

$-16+4+6$

$x<-2$ or $x>3$

$(-\infty,-2)\cup(3,\infty)$

-2 3

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

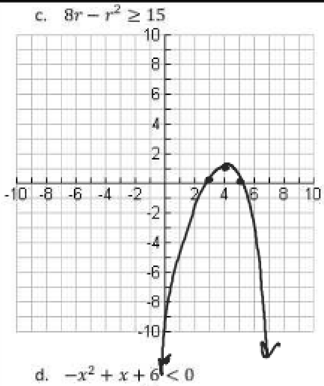
$2 \pm \frac{\sqrt{16-4}}{2}$

$2 \pm \frac{\sqrt{12}}{2}$

$2+\frac{\sqrt{12}}{2} \approx 3.7$

$2-\frac{\sqrt{12}}{2} \approx .27$

c. $8r - r^2 \ge 15$



$x = \frac{-b}{2a} = \frac{-8}{2(-1)} = 4$

$-(4)^2+8(4)-15$

$-16+32-15$

$(4,1)$

$3 \le r \le 5$

$[3,5]$

3 5

X-intercepts

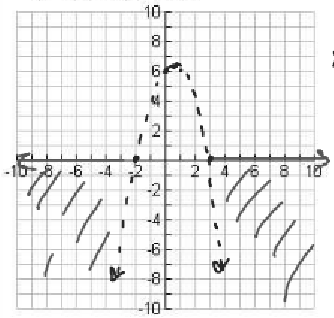
$-r^2+8r-15=0$

$r^2-8r+15=0$

$(r-5)(r-3)=0$

$r=5,3$

d. $-x^2 + x + 6 < 0$



$x = \frac{-b}{2a} = \frac{-1}{2(-1)} = \frac{1}{2}$

$-(\frac{1}{2})^2+(\frac{1}{2})+6$

$-\frac{1}{4}+\frac{1}{2}+6$

$6\frac{1}{4}$

$(\frac{1}{2}, 6\frac{1}{4})$

$(\frac{1}{2}, \frac{25}{4})$

$-x^2+x+6=0$

$x^2-x-6=0$

$(x-3)(x+2)$

$x=3,-2$

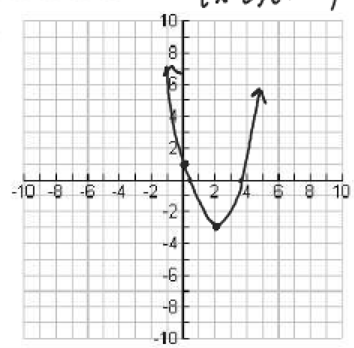
e. $x^2 - 4x + 1 \le 0$

$x = \frac{4}{2(1)} = 2$

$(2)^2-4(2)+1$

$4-8+1=-3$

$v(2,-3)$



✗ ✓ ✗

.27 3.7

$(4)^2-(4)(4)+1$

$16-16+1$

$.27 \le x \le 3.7$

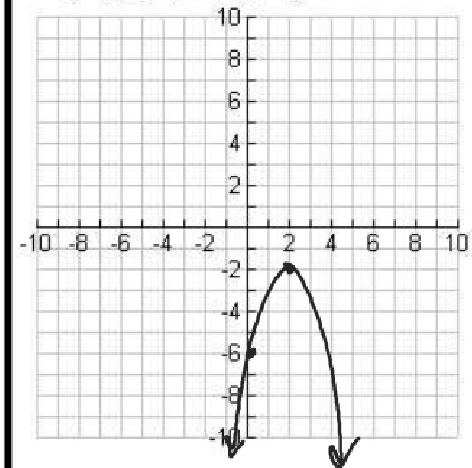
$[.27, 3.7]$

.27 3.7

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

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

f. $0 \leq -x^2 + 4x - 6$



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

$-2 \pm \frac{\sqrt{16-24}}{-2}$

$\frac{-4}{2(-1)} = 2$ $(2,-2)$

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

$-4+8-6$

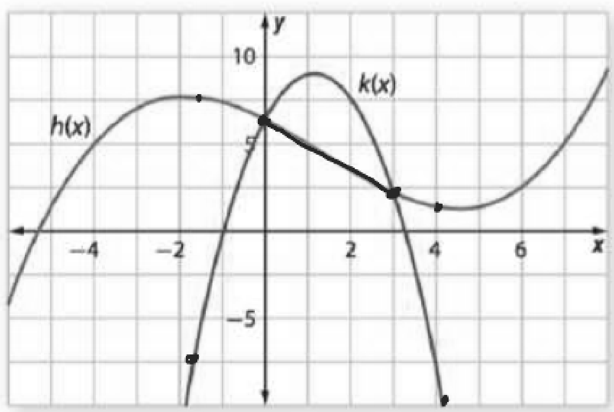
-2

No x-intercepts

$\emptyset$

Complex Inequalities

7. The diagram below shows the graph of functions *h(x)* and *k(x)*. Assume that all points of intersection are shown and that the functions have no breaks in their graphs.



a. What are the approximate values of x for which *h(x) = k(x)?*

$x = 0, 3$

b. What are the values of x for which $h(x) \leq k(x)$? Express your answer using symbols, interval notation, and a number line graph.

$0 \leq x \leq 3$

$[0, 3]$

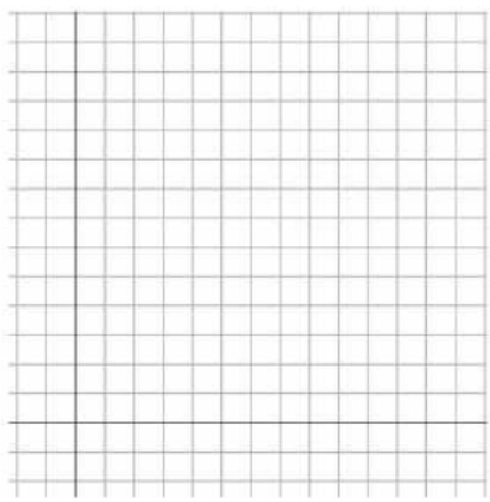
c. What are the values of x for which $h(x) > k(x)$? Express your answer using symbols, interval notation, and a number line graph.

$x < 0$ or $x > 3$

$(-\infty, 0) \cup (3, \infty)$

8. Harriet Tubman Elementary School needs to hire staff for a new after-school program. The program has a budget of $1,000 per week to pay staff salaries. The function $h(p) = \frac{1000}{p}$ shows how the number of staff that can be hired depends on the weekly pay per staff number p. Research suggested that the number of job applicants depends on the weekly pay offered according to the function $a(p) = -5 + 0.1p$.

a. Without using a graphing calculator, sketch a graph showing how h(p) and a(p) depends on p.



b. Solve $\frac{1{,}000}{p} = -5 + 0.1p$ algebraically. Then explain what the solution tell about the staffing situation for the after-school program at Harriot Tubman Elementary.

c. The program director wants to ensure that she will be able to choose her staff from a large enough pool of applicants. Write and solve an inequality.