

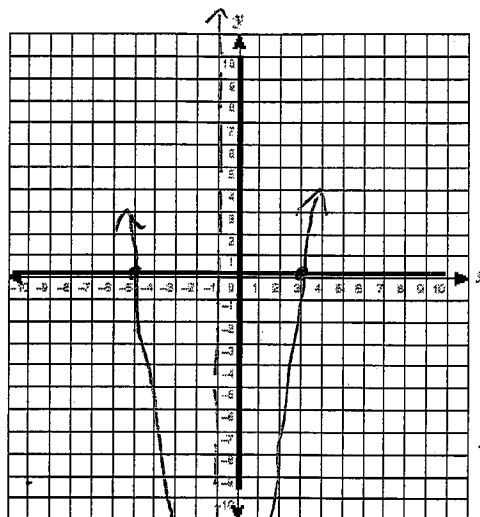
Advanced Algebra
Graphing Quadratics Test Review

Name Ky

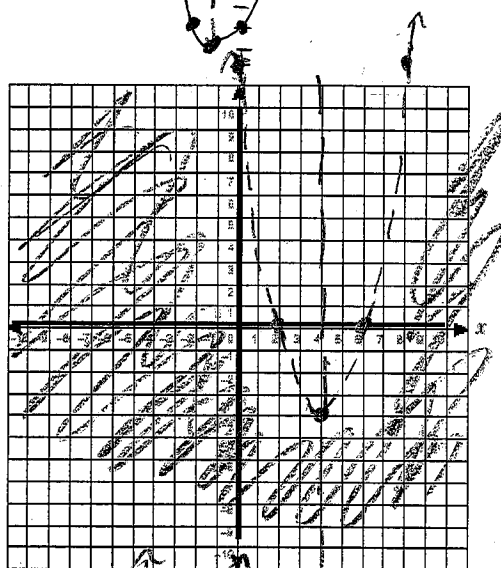
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Graph each quadratic function/inequality and the AOS. Write coordinates for all necessary steps.

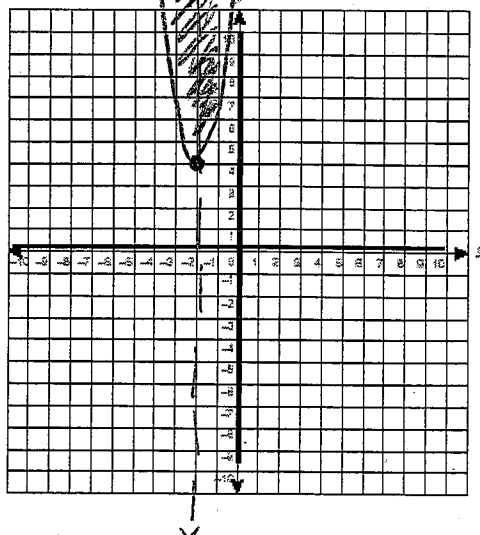
1. $y = x^2 + 2x - 15$
 $x = \frac{-2}{2(1)} = \frac{-2}{2} = -1$
 Opens: UP $y = (-1)^2 + 2(-1) - 15$
 AOS: $x = -1$ $y = -16$
 Vertex: $(-1, -16)$ $0 = x^2 + 2x - 15$
 $0 = (x+5)(x-3)$
 $x = -5 \quad x = 3$
 x-intercepts: $(-5, 0)(3, 0)$
 y-intercept: $(0, -15)$ $y = 0^2 + 2(0) - 15$
 $y = -15$
 pt of reflection: $(-2, -15)$



2. $y < x^2 - 8x + 12$
 $x = \frac{-(-8)}{2(1)} = \frac{8}{2} = 4$
 Opens: UP $y = (4)^2 - 8(4) + 12$
 AOS: $x = 4$ $y = -4$
 Vertex: $(4, -4)$ $0 = x^2 - 8x + 12$
 $0 = (x-6)(x-2)$
 $x = 6 \quad x = 2$
 x-intercepts: $(6, 0)(2, 0)$
 y-intercept: $(0, 12)$ $y = 0^2 - 8(0) + 12$
 $y = 12$
 pt of reflection: $(8, 12)$



3. $y \geq 3(x+2)^2 + 4$
 Opens: UP $0 = 3(x+2)^2 + 4$
 $-4 = 3(x+2)^2$
 $-\frac{4}{3} = (x+2)^2$
 $\pm 1.2i = x+2$
 $-2 \pm 1.2i = x$
 AOS: $x = -2$
 Vertex: $(-2, 4)$
 x-intercepts: none
 y-intercept: $(0, 16)$ $y = 3(0+2)^2 + 4$
 $y = 3(2)^2 + 4$
 $y = 3(4) + 4$
 $y = 12 + 4$
 $y = 16$
 pt of reflection: $(-4, 16)$



4. The height of a ball "h" that is tossed upwards is represented by $h(t) = -16t^2 + 96t + 3$ where "t" is time.

a) How long will it take for the ball to reach its maximum height?

$$t = \frac{-96}{2(-16)} = \frac{-96}{-32} = 3$$

3 seconds

b) What is the maximum height that the ball will reach?

$$\begin{aligned} h(3) &= -16(3)^2 + 96(3) + 3 \\ &= -16(9) + 96(3) + 3 \\ &= -144 + 288 + 3 \end{aligned}$$

$$h(3) = 147 \text{ ft}$$

5. Find a quadratic function in **standard form** that contains the following points.

$$ax^2 + bx + c = y$$

$(-4, 8), (-1, 5), (1, 13)$

$$\begin{aligned} a(-4)^2 + b(-4) + c &= 8 \rightarrow 16a - 4b + c = 8 \quad (1) \\ a(-1)^2 + b(-1) + c &= 5 \rightarrow a - b + c = 5 \quad (2) \\ a(1)^2 + b(1) + c &= 13 \rightarrow a + b + c = 13 \quad (3) \end{aligned}$$

$$\begin{aligned} (2) \quad a - b + c &= 5 & (3) \quad (a + b + c = 13) \cdot 4 \\ (3) \quad a + b + c &= 13 & (1) \quad 16a - 4b + c = 8 \\ (4) \quad 2a + 2c &= 18 & \quad 4a + 4b + 4c = 52 \\ & & (5) \quad 20a + 5c = 60 \end{aligned}$$

$$\begin{aligned} (4) \quad (2a + 2c = 18) \cdot 10 \\ (5) \quad 20a + 5c = 60 \\ \hline -20a - 20c &= -180 \\ \hline -15c &= -120 \\ \hline c &= 8 \end{aligned}$$

$$\begin{aligned} (4) \quad 2a + 2(8) &= 18 \\ 2a + 16 &= 18 \\ 2a &= 2 \\ a &= 1 \end{aligned}$$

$$\begin{aligned} (3) \quad a + b + c &= 13 \\ 1 + b + 8 &= 13 \\ b + 9 &= 13 \\ b &= 4 \end{aligned}$$

$$y = x^2 + 4x + 8$$

6. Find a quadratic equation in **vertex form** that has a vertex of $(3, 4)$ and contains the point $(5, -4)$.

h k

x y

$$y = a(x-h)^2 + k$$

$$-4 = a(5-3)^2 + 4$$

$$-4 = a(2)^2 + 4$$

$$-4 = 4a + 4$$

$$-8 = 4a$$

$$-2 = a$$

$$y = a(x-h)^2 + k$$

$$y = -2(x-3)^2 + 4$$

7. A toy rocket is shown upward from ground level. The table shows the height of the rocket at different times.

Time (sec)	0	1	2	3	4
Height (ft)	0	256	480	672	832

a) Find a quadratic model for the data using your graphing calculator.

(c = 0)

$$y = -16x^2 + 272x$$

b) Use the model to estimate the height of the rocket after 1.5 seconds

$$y = -16(1.5)^2 + 272(1.5)$$

$$y = 372 \text{ ft}$$

8. Convert the function into standard form.

$$y = -2(3x+2)^2 - 5$$

$$y = -2(3x+2)(3x+2) - 5$$

$$y = -2(9x^2 + 6x + 6x + 4) - 5$$

$$y = -18x^2 - 12x - 12x - 8 - 5$$

$$y = -18x^2 - 24x - 13$$

9. Convert the function into vertex form.

$$y = 2x^2 - 16x + 29$$

$$x = \frac{-(-16)}{2(2)} = \frac{16}{4} = 4$$

$$y = 2(4)^2 - 16(4) + 29$$

$$y = 2(16) - 16(4) + 29$$

$$y = 32 - 64 + 29$$

$$y = -3$$

$$\begin{matrix} h & k \\ (4, -3) \end{matrix}$$

$$y = a(x-h)^2 + k$$

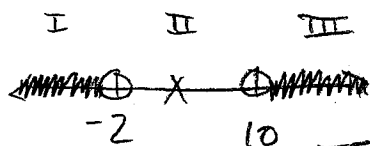
$$y = 2(x-4)^2 - 3$$

Solve each quadratic inequality.

10. $x^2 - 8x - 20 > 0$

$$(x-10)(x+2) > 0$$

$$x = 10 \quad x = -2$$



$$x < -2 \text{ or } x > 10$$

I $x = -3$

$$x^2 - 8x - 20 > 0$$

$$(-3)^2 - 8(-3) - 20 > 0$$

$$9 + 24 - 20 > 0$$

$$13 > 0$$

T

II $x = 0$

$$x^2 - 8x - 20 > 0$$

$$0^2 - 8(0) - 20 > 0$$

$$0 - 0 - 20 > 0$$

$$-20 > 0$$

F

III $x = 11$

$$x^2 - 8x - 20 > 0$$

$$(11)^2 - 8(11) - 20 > 0$$

$$121 - 88 - 20 > 0$$

$$13 > 0$$

T

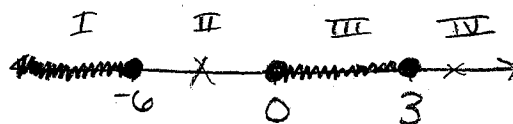
11. $2y^3 + 6y^2 \leq 36y$

$$2y^3 + 6y^2 - 36y \leq 0$$

$$2y(y^2 + 3y - 18) \leq 0$$

$$2y(y+6)(y-3) \leq 0$$

$$y = 0 \quad y = -6 \quad y = 3$$



$$y \leq -6 \text{ or } 0 \leq y \leq 3$$

I $y = -7$

$$2y^3 + 6y^2 - 36y \leq 0$$

$$2(-7)^3 + 6(-7)^2 - 36(-7) \leq 0$$

$$-686 + 294 + 252 \leq 0$$

$$-140 \leq 0 \quad \text{T}$$

II $y = -1$

$$2y^3 + 6y^2 - 36y \leq 0$$

$$2(-1)^3 + 6(-1)^2 - 36(-1) \leq 0$$

$$-2 + 6 + 36 \leq 0$$

$$40 \leq 0 \quad \text{F}$$

III $y = 1$

$$2y^3 + 6y^2 - 36y \leq 0$$

$$2(1)^3 + 6(1)^2 - 36(1) \leq 0$$

$$2 + 6 - 36 \leq 0$$

$$-28 \leq 0 \quad \text{T}$$

IV $y = 4$

$$2y^3 + 6y^2 - 36y \leq 0$$

$$2(4)^3 + 6(4)^2 - 36(4) \leq 0$$

$$128 + 96 - 144 \leq 0$$

$$80 \leq 0 \quad \text{F}$$