

Name: _____

INTRODUCTION TO QUADRATICS WORKBOOK

Unit Outline:

- a. Properties of Parabolas
- b. Zeros form
- c. Vertex Form
- d. Graphing from Vertex Form
- e. Writing Quadratic Relations
- f. Completing the Square

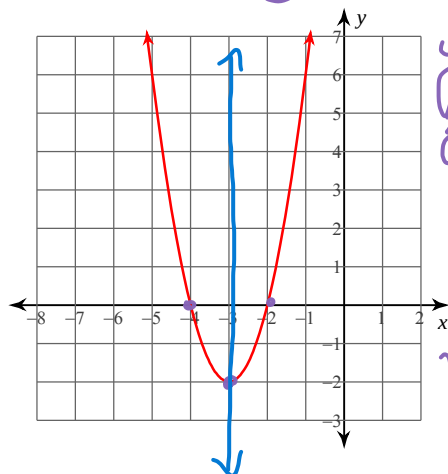
Properties of Parabolas

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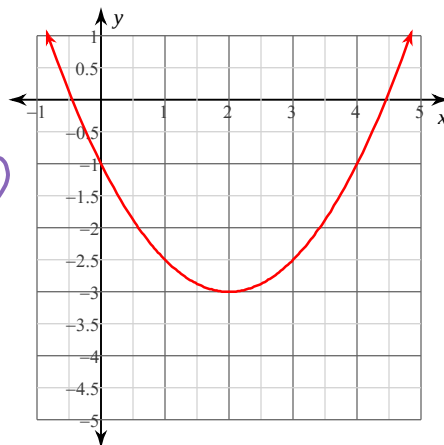
For each graph, identify the y-intercept, zeros, vertex, AoS, and Max/Min Value.

1) $y = 2x^2 + 12x + 16$

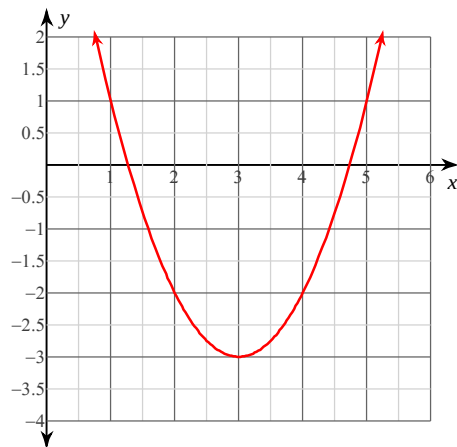


$y\text{-int} = 16$
 $\text{zeros} = (-4, 0)$
 $(-2, 0)$
 $V(-3, -2) = V(h, k)$
 $\text{AoS: } x = -3$
 $\text{min} = -2$

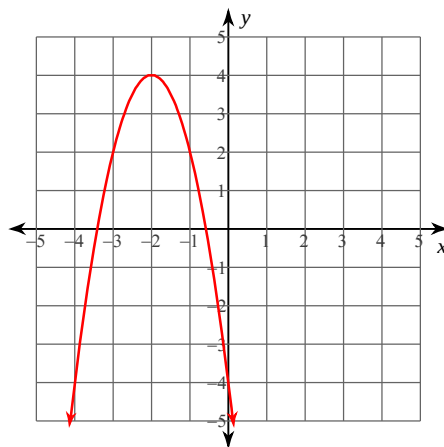
2) $y = \frac{1}{2}x^2 - 2x - 1$



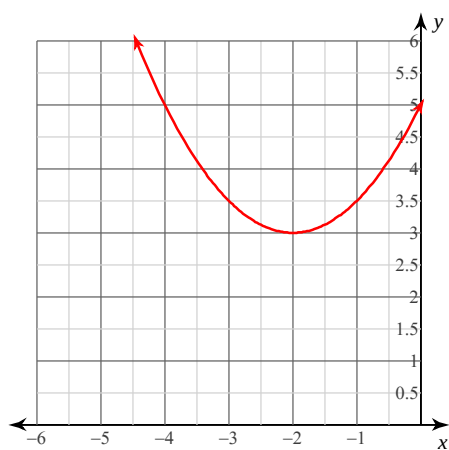
3) $y = x^2 - 6x + 6$



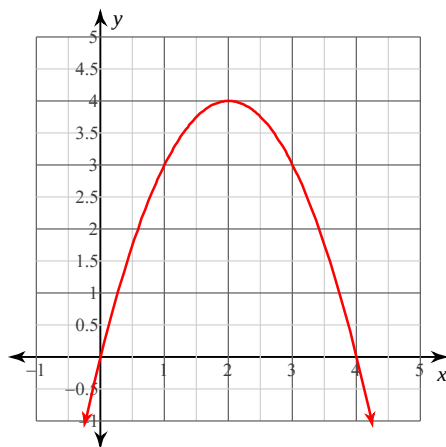
4) $y = -2x^2 - 8x - 4$



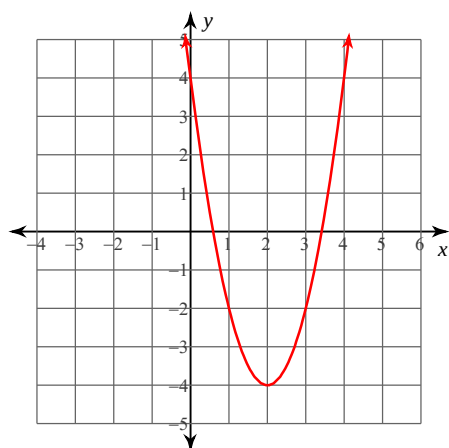
5) $y = \frac{1}{2}x^2 + 2x + 5$



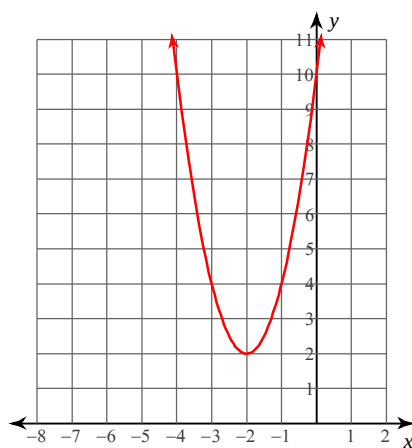
6) $y = -x^2 + 4x$



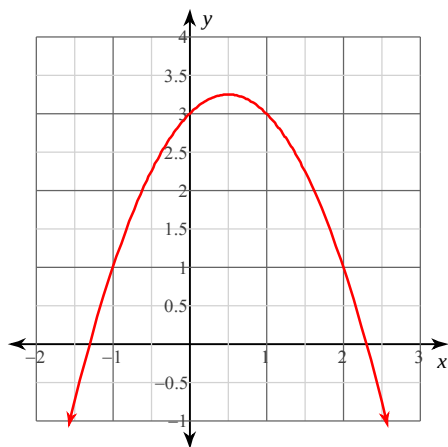
7) $y = 2x^2 - 8x + 4$



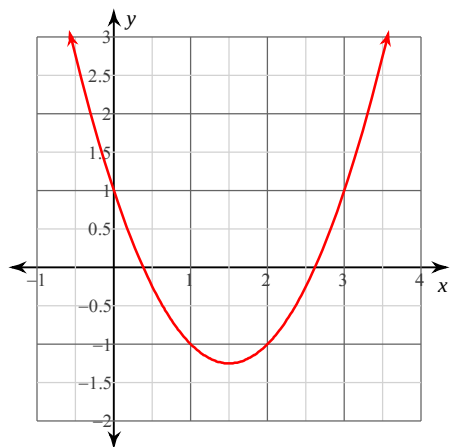
8) $y = 2x^2 + 8x + 10$



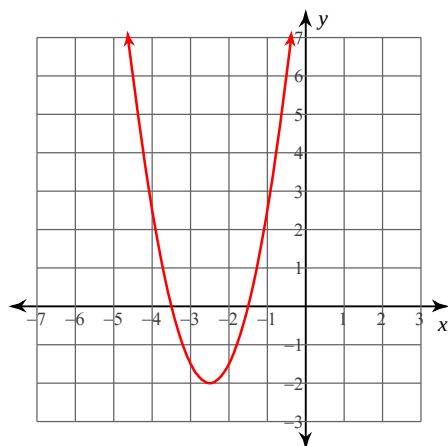
9) $y = -x^2 + x + 3$



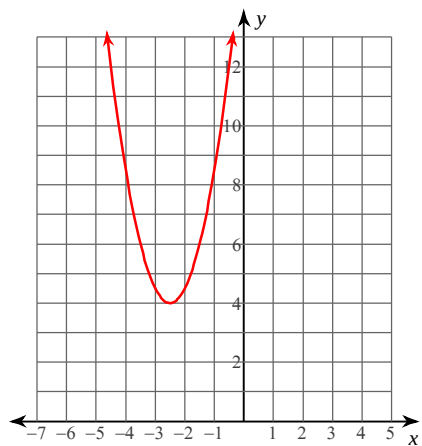
10) $y = x^2 - 3x + 1$



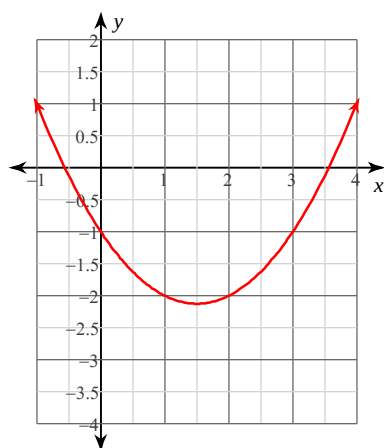
11) $y = 2x^2 + 10x + \frac{21}{2}$



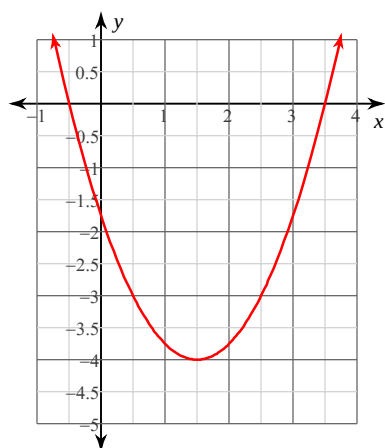
12) $y = 2x^2 + 10x + \frac{33}{2}$



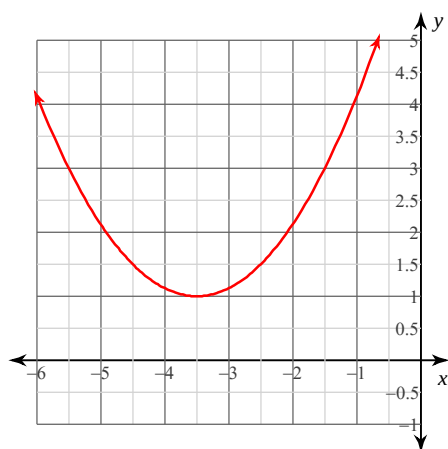
$$13) y = \frac{1}{2}x^2 - \frac{3}{2}x - 1$$



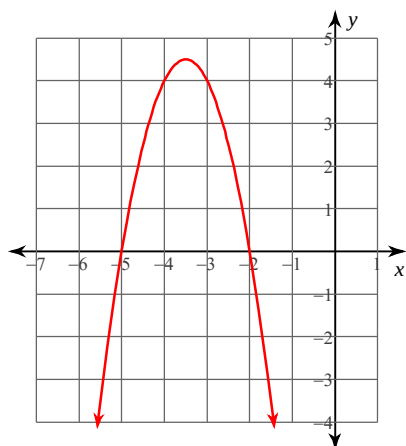
$$14) y = x^2 - 3x - \frac{7}{4}$$



$$15) y = \frac{1}{2}x^2 + \frac{7}{2}x + \frac{57}{8}$$



$$16) y = -2x^2 - 14x - 20$$



Factored Form

Date_____

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Convert to Zeros Form, then state the zeros, AoS and vertex.

1) $y = 2x^2 - 24x + 70$

2) $y = -4x^2 + 20x - 16$

3) $y = -x^2 + 9x - 18$

4) $y = x^2 + 10x + 25$

5) $y = -4x^2 - 12x$

6) $y = 3x^2 - 15x - 150$

7) $y = 6x^2 - 96$

8) $y = x^2 + 4x - 60$

9) $y = 5x^2 + 18x + 16$

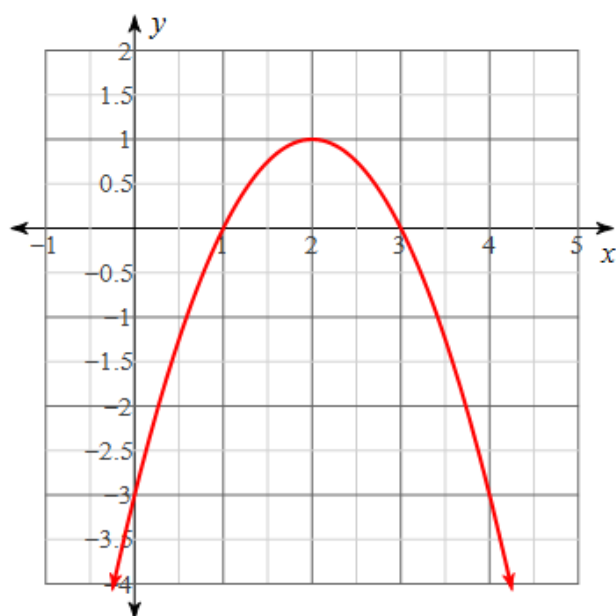
10) $y = 2x^2 - 7x + 5$

11) $y = 8x^2 + 30x + 27$

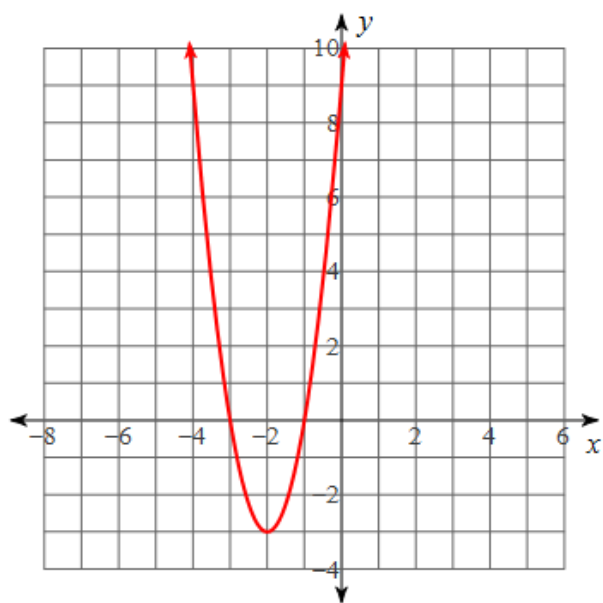
12) $y = -4x^2 + 45x - 50$

Write the parabolas in both Zeros Form and Standard Form.

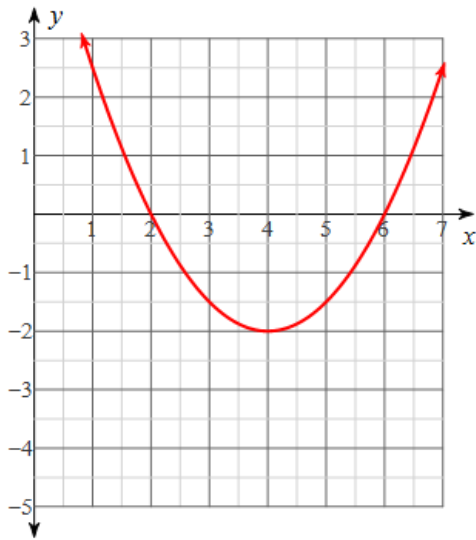
13.



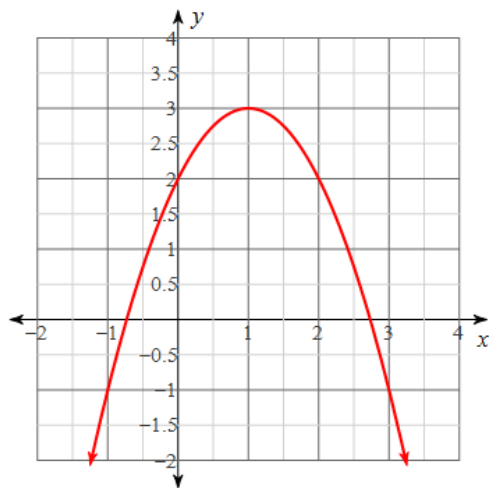
14.



15.



16. Estimate the zeros, but make sure that the average of the zeros is the AoS.



17. Make your own! Your zeros are $x = \underline{\hspace{1cm}}$ and $x = \underline{\hspace{1cm}}$. A point on the graph is $(\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$. What is the zeros form?

Vertex Form

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

Identify the vertex, axis of symmetry, direction of opening, and y-intercept of each.

1) $y = -8(x - 3)^2 - 1$

2) $y = 2(x + 3)^2 + 7$

$$v(h, k) = (3, -1)$$

$$\text{AoS: } x = h \Rightarrow x = 3$$

$$\text{D.O: } a = -8 < 0 \Rightarrow \text{opens down}$$

$$\begin{aligned} y_{\text{int}} &= -8(0 - 3)^2 - 1 \\ &= -8(9) - 1 \\ &= -72 - 1 = -73 \equiv (0, -73) \end{aligned}$$

3) $y = -\frac{1}{17}(x + 1)^2 + 8$

4) $y = 3(x - 6)^2 + 4$

Convert from Vertex Form to Standard Form by expanding.

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

6) $y = -(x + 8)^2 - 5$

$$y = 3[(x + 4)(x + 4)] + 2$$

$$y = 3[x^2 + 4x + 4x + 16] + 2$$

$$y = 3[x^2 + 8x + 16] + 2$$

$$y = 3x^2 + 24x + 48 + 2$$

$$y = 3x^2 + 24x + 50$$

$$7) y = -\frac{1}{11}(x-5)^2 - 4$$

$$8) y = -2(x-3)^2 - 9$$

$$9) y = 2(x+9)^2 + 3$$

$$10) y = 7(x-4)^2 + 1$$

Convert from Standard Form to Vertex Form by finding the zeros, AoS and the vertex.

$$11) y = \frac{3x^2}{3} - \frac{12x}{3} - \frac{96}{3}$$

$$12) y = -2x^2 - 14x - 20$$

$$y = 3(x^2 - 4x - 32)$$

$$y = 3(x-8)(x+4)$$

$$h = 8 ; s = -4$$

$$\therefore h = \frac{8 + -4}{2} = 2$$

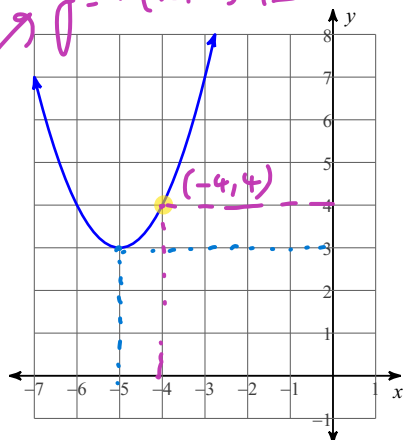
$$k : y_{x=2} = 3(2-8)(2+4) \\ = 3(-6)(6) \\ = -108$$

Zeros (x,0) (s,0)	(8,0), (-4,0)	Vertex (h,k)	(2,-108)
AoS x=h	x=2		

State the vertex and another point, then write the vertex form equation of the parabola.

13)

$$y = 1(x+5)^2 + 3$$



$$V(h, k) = (-5, 3)$$

$$P(x, y) = (-4, 4)$$

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

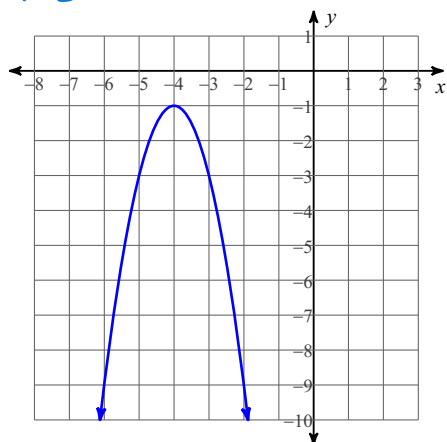
$$4 = a(-4+5)^2 + 3$$

$$4 = a(1) + 3 \Rightarrow a = 1$$

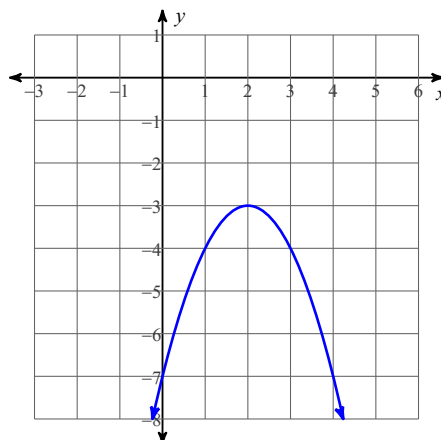
$$4 = a + 3$$

$$4 - 3 = a$$

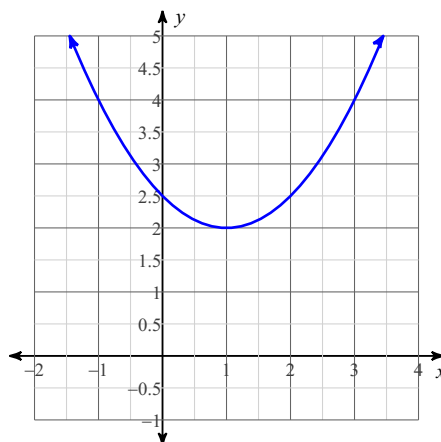
15)



14)



16)



- 17) A potato is shot out of a potato gun. After 5 seconds, the potato reaches a maximum height of 400ft. The potato mashes into the ground after 10 seconds. Determine the equation, in vertex form, that represents the path of the potato.

For each question, list the transformations and create the necessary table of values. Then, graph the final result on the provided graph paper.

1. $y = 2(x - 3)^2 + 6$

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

3. $y = \frac{1}{2}(x - 8)^2 - 10$

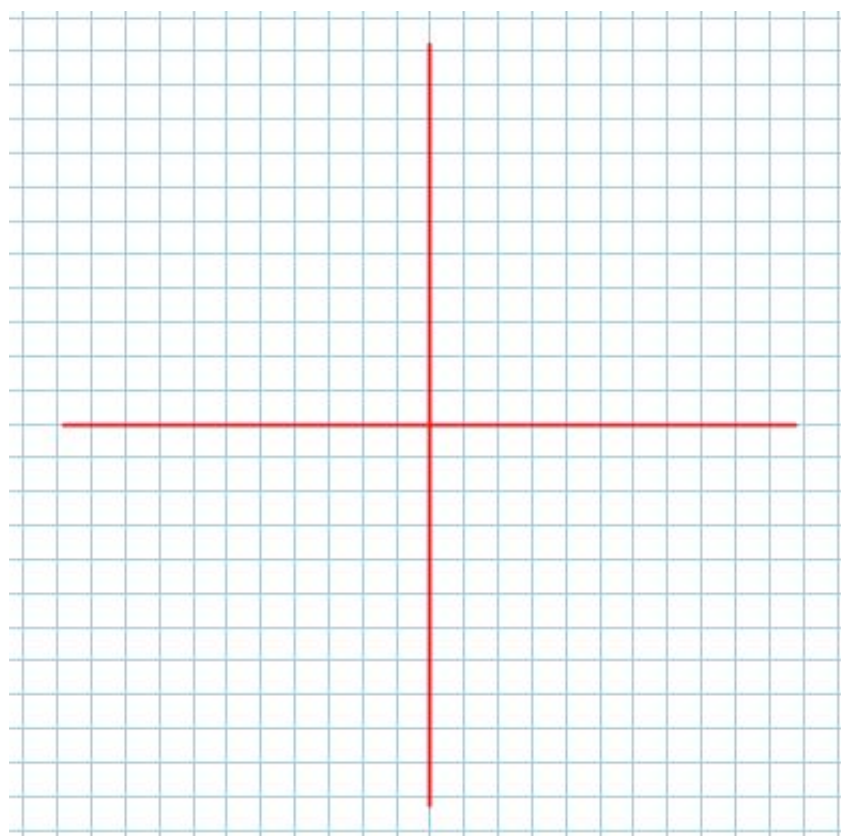
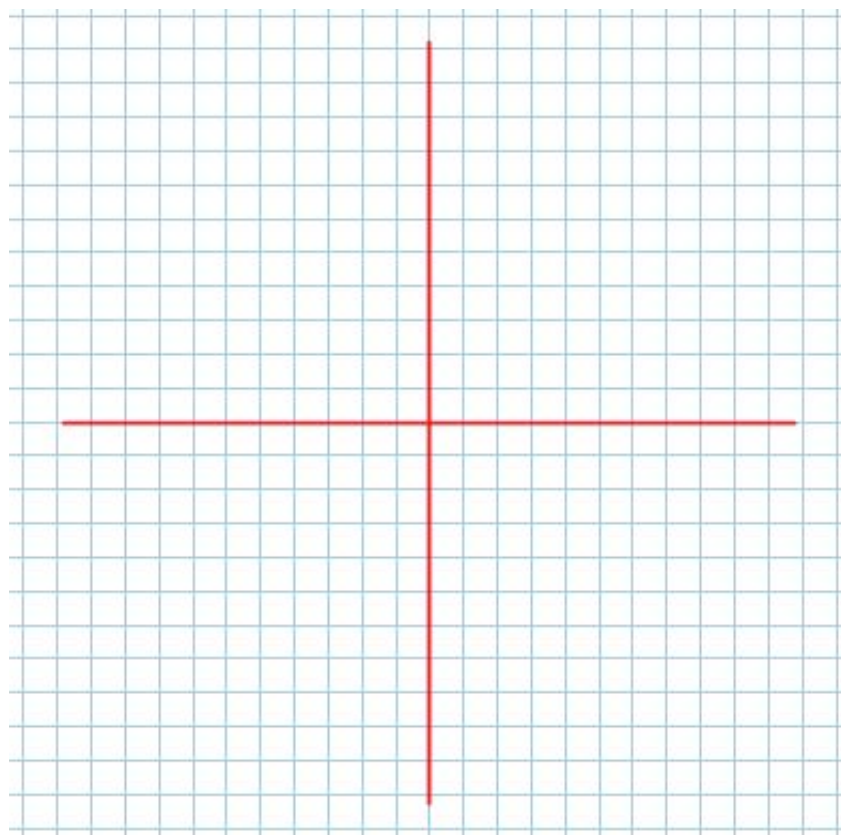
4. $y = -\frac{2}{3}(x + 9)^2 + 8$

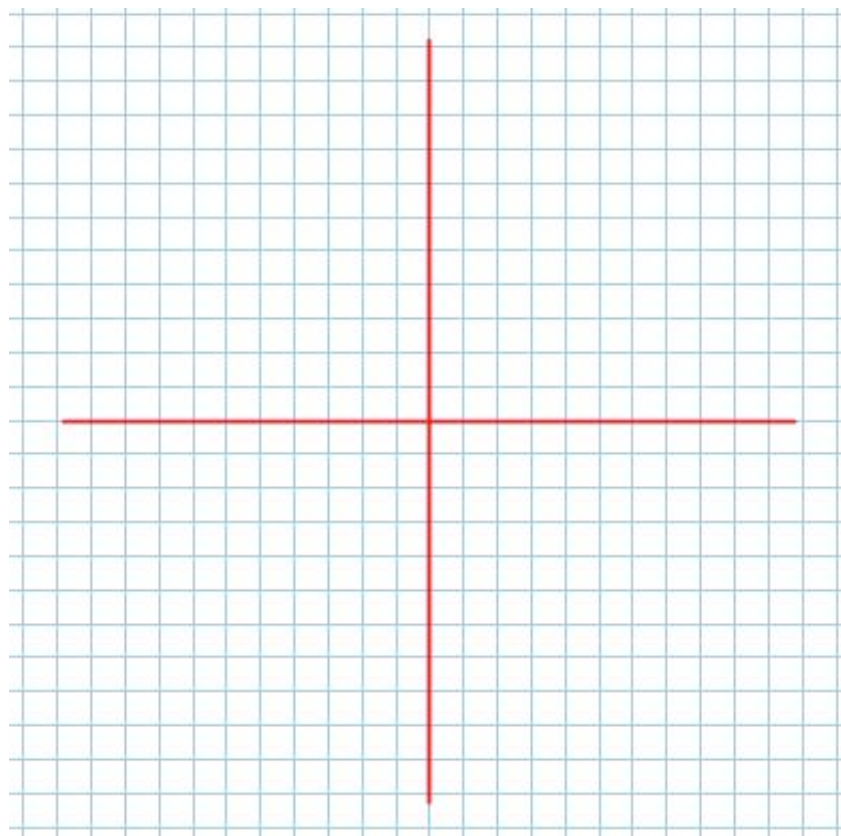
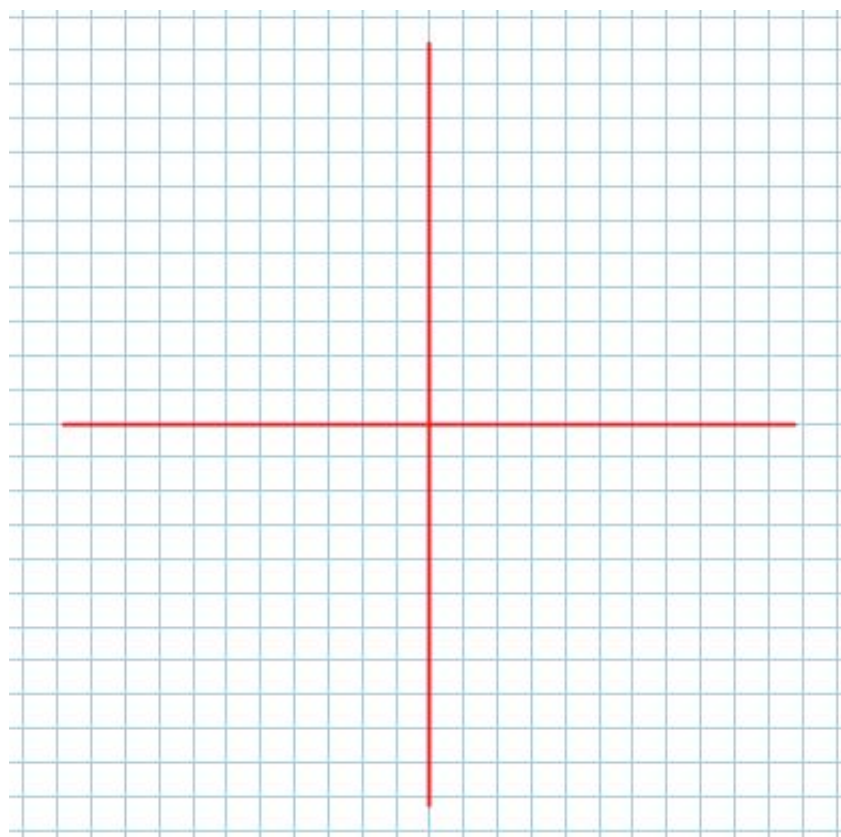
5. $y = -4x^2 - 5$

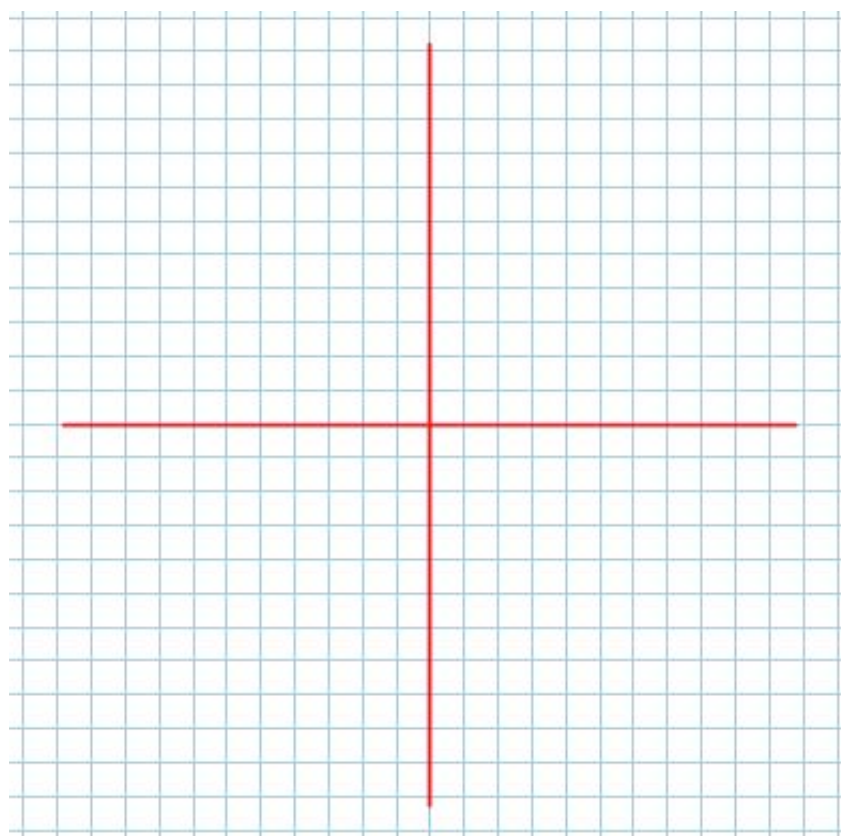
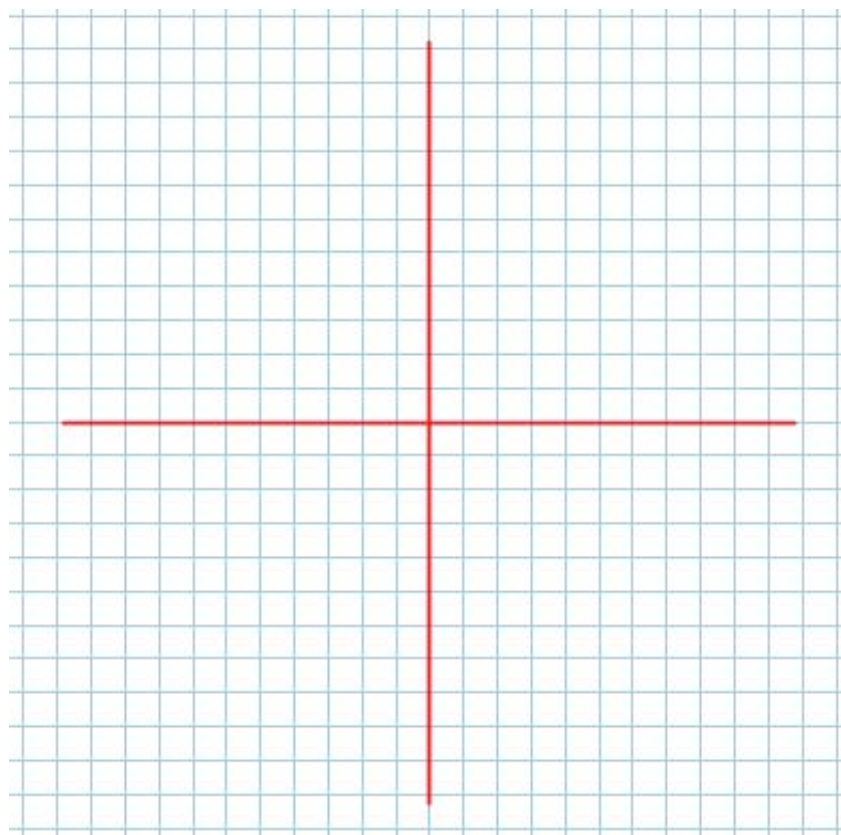
6. $y = \frac{3}{5}(x - 7)^2$

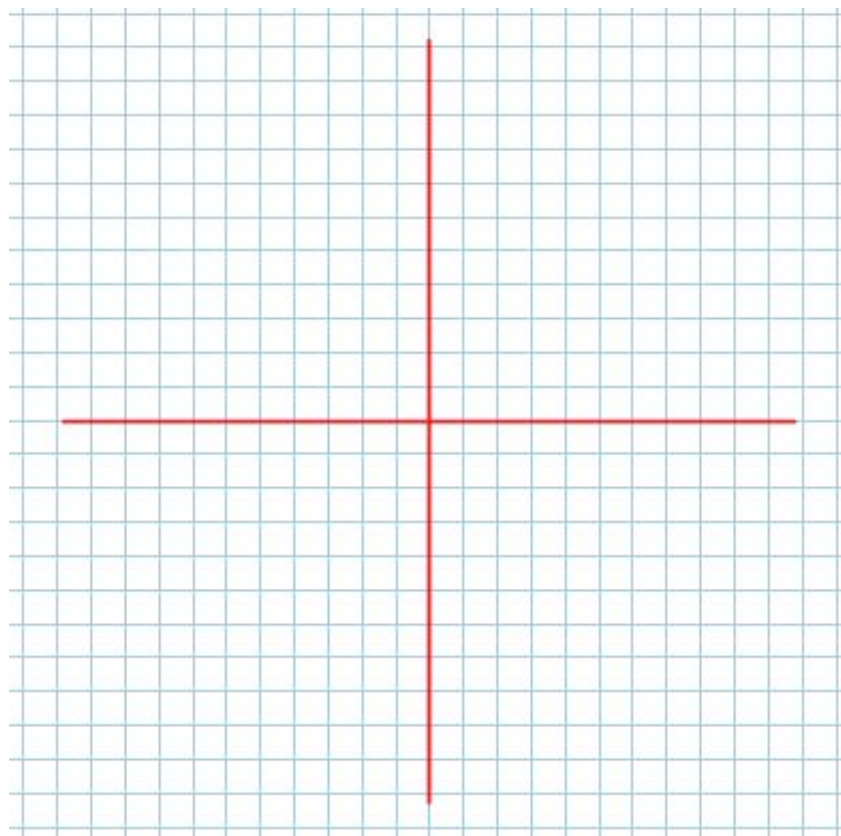
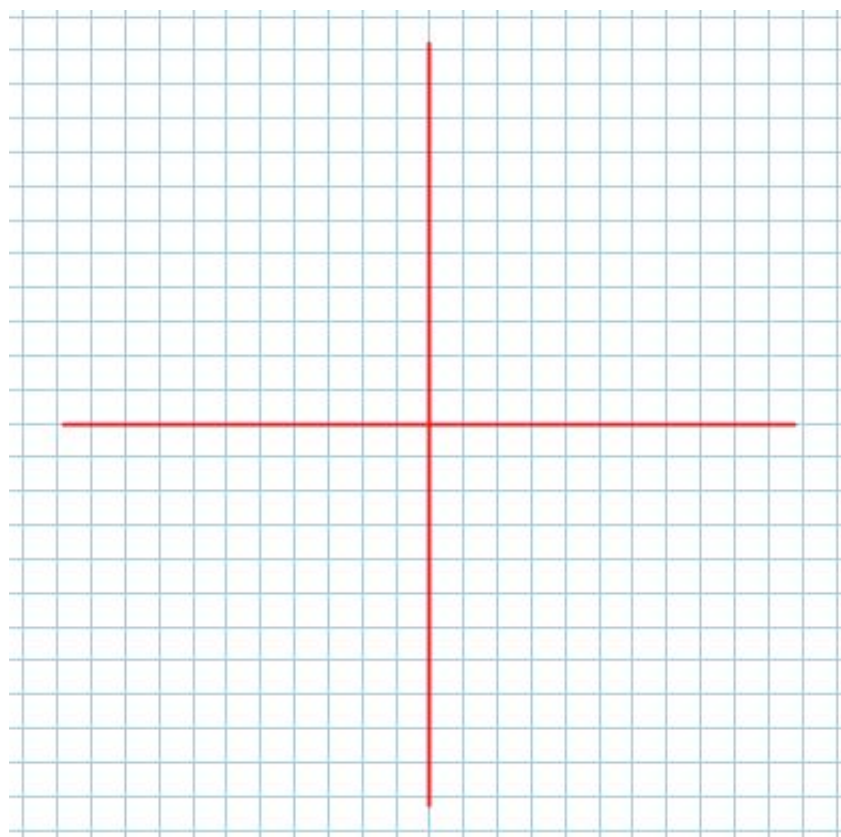
7. $y = \frac{3}{2}(x - 12)^2 - 15$

8. $y = 2x^2 + 20x + 42$ (First put it in vertex form)









Math 10D - Complete the square. State the vertex.

Name: _____

1. $y = 3x^2 + 24x - 10$

2. $y = -10x^2 + 180x - 807$

3. $y = \frac{1}{2}x^2 - 2x - 3$

4. $y = \frac{2}{3}x^2 + 16x$

5. $y = -9x^2 - 54x - 22$

6. $y = -2.5x^2 - 35x - 100$

7. $y=4x^2+12x-7$

8. $y=-3x^2+15x-8$

9. $y=6x^2+12x+5$

10. $y=5x^2-13x+8$

11. $y=-1.2x^2-4.8x+3.1$

12. $y=3.62x^2+9.24x+7.46$