Math 10D Date_____

Zeros/Factored Form

Convert to Factored/Zeros Form, then state the zeros, AoS and vertex. Sketch #1 and #2

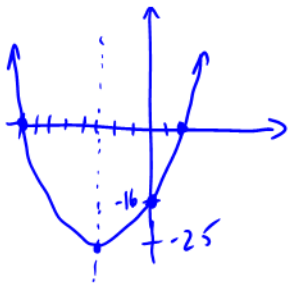
1) $y = x^2 + 6x - 16$

$y = (x+8)(x-2)$

Zeros: $x = -8, 2$

A.o.S: $x = -3$

Vertex: $(-3, -25)$



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

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

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

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

Zeros: $x = 0, -3$

A.o.S: $x = -1.5$

Vertex: $(-1.5, -9)$

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

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

$y = 6(x-4)(x+4)$

Zeros: $x = 4, -4$

A.o.S: $x = 0$

Vertex: $(0, -96)$

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

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

$y = (5x+8)(x+2)$

$y = 5(x+\frac{8}{5})(x+2)$

Zeros: $x = -\frac{8}{5}, -2$

A.o.S: $x = -\frac{9}{5}$

Vertex: $(-\frac{9}{5}, -\frac{1}{5})$

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

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

$y = (4x+9)(2x+3)$

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

Zeros: $x = -\frac{9}{4}, -\frac{3}{2}$

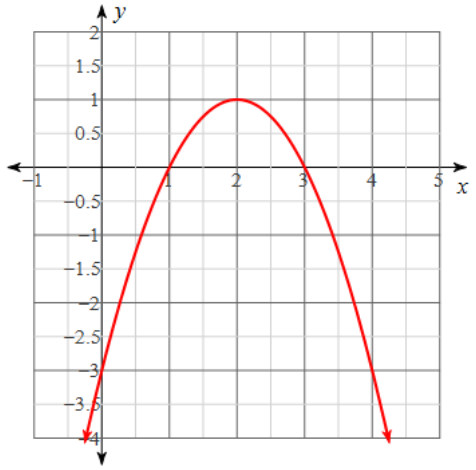
A.o.S: $x = -\frac{15}{8}$

Vertex: $(-\frac{15}{8}, -\frac{9}{8})$

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

Write the parabolas in both Zeros Form and Standard Form.

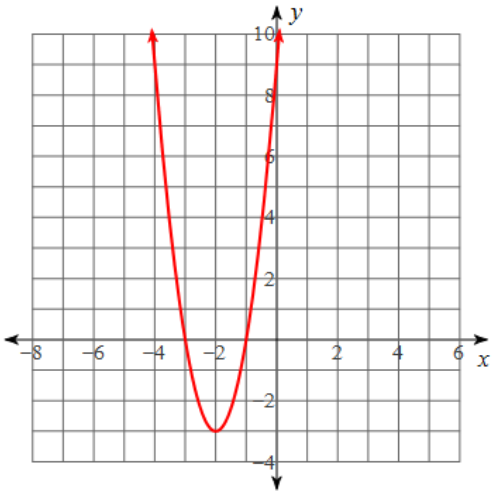
11.



$y = -(x-1)(x-3)$

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

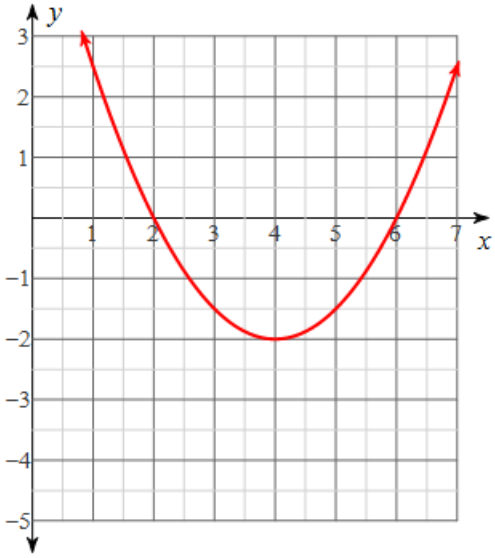
12.



$y = 3(x+1)(x+3)$

$y = 3x^2 + 12x + 9$

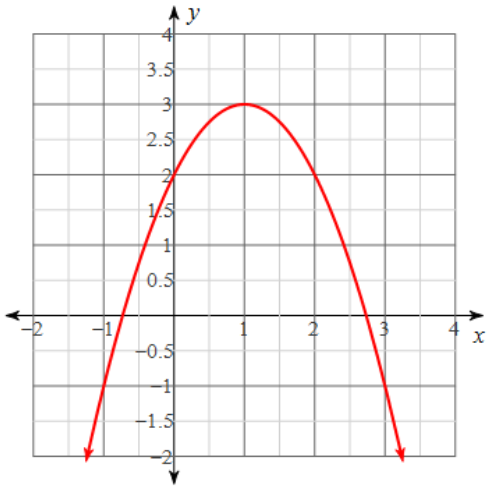
13.



$y = \frac{1}{2}(x-2)(x-6)$

$y = \frac{1}{2}x^2 - 4x + 6$

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



$y = -(x + 0.7)(x - 2.7)$

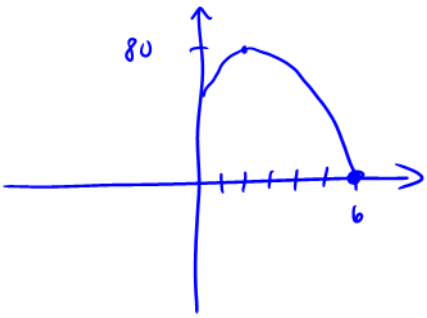
exact: $y = -x^2 + 2x + 2$

15. Make your own! Your zeros are x=____ and x=____. A point on the graph is (____,____). What is the zeros form?

16. A ball is thrown upwards from the top of an apartment building. The ball reaches a maximum height of 80m after 2 seconds. The ball hits the ground ~~after~~ at 6 seconds.

a) Determine the equation, in Zeros Form, of the relation between time and height. Make a sketch.

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



b) What height is the ball thrown from? 60 m

c) What are the zeros and what do they represent?

6 : When the ball hits the ground

-2 : This is not really a part of the graph. It is before the graph starts (0 seconds)

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Vertex Form

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

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

Vertex: $(3, -1)$
Axis of Sym.: $x = 3$
Opens: Down
y-int: -73

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

Vertex: $(-3, 7)$
Axis of Sym.: $x = -3$
Opens: Up
y-int: 25

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

Vertex: $(-1, 8)$
Axis of Sym.: $x = -1$
Opens: Down
y-int: $\frac{135}{17}$

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

Vertex: $(6, 4)$
Axis of Sym.: $x = 6$
Opens: Up
y-int: 112

Convert from Vertex Form to Standard Form by expanding.

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

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

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

$y = -x^2 - 16x - 69$

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

$y = -\frac{1}{11}x^2 + \frac{10}{11}x - \frac{69}{11}$

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

$y = -2x^2 + 12x - 27$

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

$y = 2x^2 + 36x + 165$

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

$y = 7x^2 - 56x + 113$

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

11) $y = 3x^2 - 12x - 96$

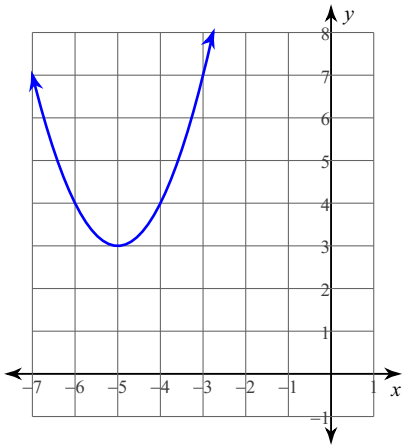
$y = 3(x-2)^2 - 108$

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

$y = -2(x+3.5)^2 + 4.5$

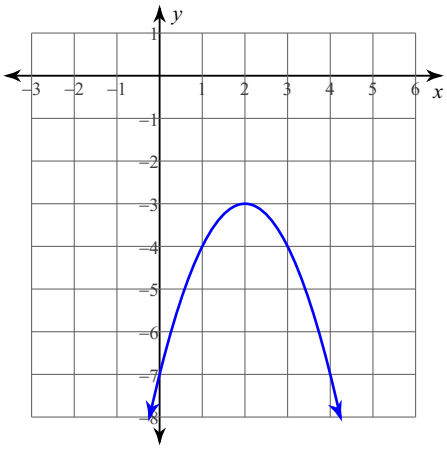
State the vertex and another point, then write the vertex form equation of the parabola.

13)



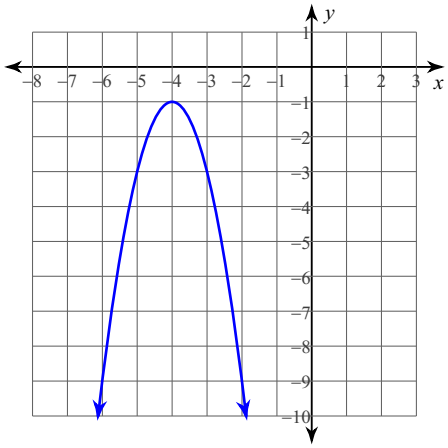
$y = (x+5)^2 + 3$

14)



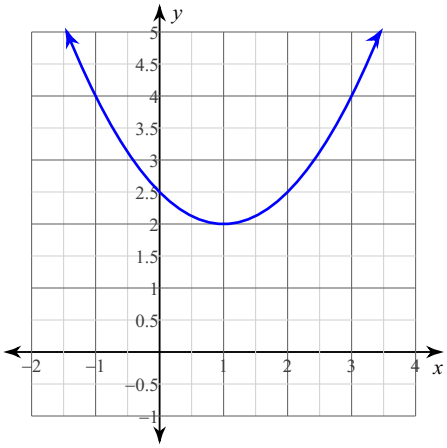
$y = -(x-2)^2 - 3$

15)



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

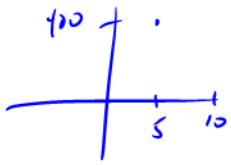
16)



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

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.

$y = -16(x-5)^2 + 400$



Writing Quadratic Relations

Given the following information, write an equation to describe the relationship.

1. Vertex $(3, -2)$ and passes through $(3,\ 8)$.

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

2. Zeros at 2 and 5, and a *y*-intercept of -2.

$y = -\frac{1}{5}(x-2)(x-5)$

3. Passes through $(2,\ 3)$ and $(-4,\ 3)$ and a maximum of 6.

$y = -\frac{1}{3}(x+1)^2 + 6$

4. A minimum of $(6,\ -2)$ and a zero at $x = 3$.

$y = \frac{2}{9}(x-6)^2 - 2$

or

$y = \frac{2}{9}(x-3)(x-9)$

Check your work on Desmos

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

For each question, list the transformations and create the necessary table of values. Then, graph the final result on the provided graph paper, labelling the axis of symmetry, vertex and 3 important points.

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

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

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

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

Check your work on Desmos

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

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

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

8. $y = 2x^2 + 20x + 39$ (First put it in vertex form)