Name: _____

11.5.D2 – THE VERTEX OF QUADRATIC FUNCTIONS

Past due on: _____ Period: _____

Write a vertical motion model of the form $h(t) = -16t^2 + v_0t + h_0$ the represents the problem situation. Then use a graphing calculator to find the function's vertex and its axis of symmetry. *Refer to the 11.4 example "Determining the Vertex of Quadratic Functions" in the Chapter 11 Summary.*

1. A catapult hurls a grapefruit from a height of 24 feet at an initial velocity of 80 feet per second.

2. A softball is thrown from a height of 20 feet at an initial velocity of 48 feet per second.

Determine the axis of symmetry of each parabola. *Refer to the TWO 11.5 examples "Determining the Axis of Symmetry of Quadratic Functions" & "Determine the Axis of Symmetry Using Symmetric Points" in the Chapter 11 Summary.*

3. The x-intercepts of a parabola are $(3, 0)$ & $(9, 0)$.

4. The x-intercepts of a parabola are $(-3, 0)$ & $(1, 0)$.

5. Two symmetric points on a parabola are $(-1, 4)$ & $(6, 4)$.

6. Two symmetric points on a parabola are $(-4, 8)$ & $(2, 8)$.

Determine the vertex of each parabola. *Refer to the 11.5 example "Determining the Vertex of Quadratic Functions" in the Chapter 11 Summary.*

7. $f(x) = x^2 + 2x - 15$
   axis of symmetry: $x = -1$

8. $f(x) = x^2 + 4x - 12$
   x-intercepts: $(-6, 0)$ & $(2, 0)$

9. $f(x) = -x^2 - 14x - 45$
   x-intercepts: $(-9, 0)$ & $(-5, 0)$

10. $f(x) = -x^2 + 8x + 20$
    Two symmetric points: $(-1, 11)$ & $(9, 11)$

Determine another point on each parabola. *Refer to the 11.5 example "Determining Symmetric Points on the Parabola Using the Vertex" in the Chapter 11 Summary.*

11. point: $(1, 4)$; axis of symmetry: $x = 3$

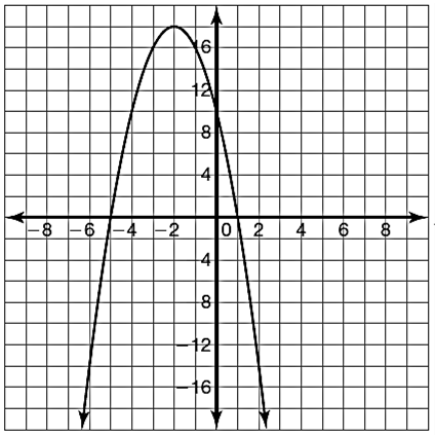
12. point: $(-3, 2)$; axis of symmetry: $x = 1$

13. point: $(5, 2)$; vertex: $(3, -1)$

14. point: $(-1, 6)$; vertex: $(2, 3)$

For the function shown, identify the domain, range, vertex, axis of symmetry, y-intercept, zeros, and the intervals of increase and decrease. *Refer to the THREE 11.3 examples "Identifying/Determining Domain & Range/ Zeros/Intervals of Increase & Decrease of a Quadratic Function" in the Chapter 11 Summary.*

15. $f(x) = -2x^2 - 8x + 10$



Domain: _____

Range: _____

Vertex: _____

Axis of symmetry: _____

y-intercept: _____

Zeros: _____

Interval of increase: _____

Interval of decrease: _____

Use the zeros to write the factored form of the quadratic function. If necessary, factor out a common factor first.

Calculate the first and second differences for each table of values. Describe the type of function represented by the table: linear or quadratic. *Refer to the 11.2 example "Identifying Linear & Quadratic Functions" in the Chapter 11 Summary.*

16.

x	y	FIRST DIFFERENCES	SECOND DIFFERENCES
0	8		
1	6	_____	_____
2	0	_____	_____
3	-10	_____	
4	-24		

17.

x	y	FIRST DIFFERENCES	SECOND DIFFERENCES
-2	-4		
-1	1	_____	_____
0	6	_____	_____
1	11	_____	
2	19		

A home improvement show is designing a backyard for a family. They want to install a rectangular pool in the center of the back yard. The perimeter of the pool is 40 feet.

18. Write an expression that represents the length in terms of the width, x. Then write a quadratic function in standard form that represents the area, A, as a function of the width. *Refer to the 11.1 example "Writing Quadratic Functions in Standard Form" in the Chapter 11 Summary.*

    If x = the width, then the length = _____ & the area, A = _____

19. Use a graphing calculator to determine the absolute maximum or minimum of this function. Describe what it means in terms of the problem situation. *Refer to the 11.1 example "Identifying Maximums & Minimums of Quadratic Graphs" in the Chapter 11 Summary.*