

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period:\_\_\_\_**

**Chapter 4 Notes Packet on Quadratic Functions and Factoring**

**Notes #15: Graphing quadratic equations in standard form, vertex form, and intercept form.**

***A. Intro to Graphs of Quadratic Equations: ***

* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a function that can be written in the form  where a, b, and c are real numbers and a0. Ex:   
* The graph of a quadratic function is a U-shaped curve called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The maximum or minimum point is called the \_\_\_\_\_\_\_\_\_\_\_\_\_

**Identify the vertex of each graph; identify whether it is a minimum or a maximum.**

**1.) 2.)**

Vertex: ( , ) \_\_\_\_\_\_\_\_\_ Vertex: ( , ) \_\_\_\_\_\_\_\_\_

**3.) 4.)**

Vertex: ( , ) \_\_\_\_\_\_\_\_\_ Vertex: ( , ) \_\_\_\_\_\_\_\_\_

***B.* Key Features of a Parabola: ****

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| * **Direction of Opening:** When , the parabola opens \_\_\_\_\_\_\_\_:   When , the parabola opens \_\_\_\_\_\_\_\_:   * **Width:** When , the parabola is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than   When , the parabola is the \_\_\_\_\_\_\_\_ width as  When , the parabola is \_\_\_\_\_\_\_\_ than   * **Vertex:** The highest or lowest point of the parabola is called the vertex, which is on the axis of symmetry. To find the vertex, plug in and solve for *y*. This yields a point (\_\_\_\_, \_\_\_\_) * **Axis of symmetry:** This is a vertical line passing through the vertex. Its equation is: * ***x*-intercepts:** are the 0, 1, or 2 points where the parabola crosses the *x*-axis. Plug in *y* = 0 and solve for *x*. * ***y*-intercept:** is the point where the parabola crosses the *y*-axis. Plug in *x* = 0 and solve for *y.* |

**Without graphing the quadratic functions, complete the requested information:**

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| **5.)**  What is the direction of opening? \_\_\_\_\_\_\_  Is the vertex a max or min? \_\_\_\_\_\_\_  Wider or narrower than *y* = *x*2 ? \_\_\_\_\_\_\_\_\_\_ | **6.)**  What is the direction of opening? \_\_\_\_\_\_\_  Is the vertex a max or min? \_\_\_\_\_\_\_  Wider or narrower than *y* = *x*2 ? \_\_\_\_\_\_\_\_\_\_\_ |
| **7.)**  What is the direction of opening? \_\_\_\_\_\_\_  Is the vertex a max or min? \_\_\_\_\_\_\_  Wider or narrower than *y* = *x*2 ? \_\_\_\_\_\_\_\_\_\_ | **8.)**  What is the direction of opening? \_\_\_\_\_\_\_  Is the vertex a max or min? \_\_\_\_\_\_\_  Wider or narrower than *y* = *x*2 ? \_\_\_\_\_\_\_\_\_\_\_ |

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| The parabola *y* = *x*2 is graphed to the right.  Note its vertex (\_\_\_, \_\_\_) and its width.  You will be asked to compare other parabolas to this graph. |  |

***C.* Graphing in STANDARD FORM (**): we need to find the vertex first.**

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| **Vertex**  - list *a = \_\_\_\_, b = \_\_\_\_, c = \_\_\_\_*  - find *x*  =  - plug this *x*-value into the function (table)  - this point (\_\_\_, \_\_\_) is the vertex of the parabola | **Graphing**  - put the vertex you found in the center of  your *x*-*y* chart.  - choose 2 *x*-values less than and 2 *x*-values more than your vertex.  - plug in these *x* values to get 4 more points.  - graph all 5 points |

Find the vertex of each parabola. Graph the function and find the requested information

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| **9.)** *f(x)=* -*x*2 + 2*x* + 3 *a* = \_\_\_\_, *b* = \_\_\_\_, *c* = \_\_\_\_ | Vertex: \_\_\_\_\_\_\_  Max or min? \_\_\_\_\_\_\_  Direction of opening? \_\_\_\_\_\_\_  Axis of symmetry: \_\_\_\_\_\_\_\_  Compare to the graph of *y* = *x*2  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| **10.)**  *h*(*x) =* 2*x*2 + 4*x* + 1 | Vertex: \_\_\_\_\_\_\_  Max or min? \_\_\_\_\_\_\_  Direction of opening? \_\_\_\_\_\_\_  Axis of symmetry: \_\_\_\_\_\_\_\_  Compare to the graph of *y* = *x*2  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **11.)** *k(x) =* 2 – *x* –*x*2 | Vertex: \_\_\_\_\_\_\_  Max or min? \_\_\_\_\_\_\_  Direction of opening? \_\_\_\_\_\_\_  Axis of symmetry: \_\_\_\_\_\_\_\_  Compare to the graph of *y* = *x*2  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**12.)** State whether the function y = −3x2 + 12x − 6 has a minimum value or a maximum

value. Then find the minimum or maximum value.

**13.)** Find the vertex of  . State whether it is a minimum or maximum. Find that minimum or maximum value.

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| Another useful form of the quadratic function is the vertex form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  **GRAPH OF VERTEX FORM *y* = *a*(*x* − *h*)2+ *k***  The graph of *y* = *a*(*x* − *h*)2 *+ k* is the parabola *y* = *ax*2 translated \_\_\_\_\_\_\_\_\_\_\_ *h* units and \_\_\_\_\_\_\_\_\_\_\_ *k* units.   * The vertex is (\_\_\_, \_\_\_). * The axis of symmetry is *x* = \_\_\_*.* * The graph opens up if a \_\_\_ 0 and down if a *\_\_\_* 0. |

Find the vertex of each parabola and graph.

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| **13.)** | Vertex: \_\_\_\_\_\_\_ |
| **14.)** | Vertex: \_\_\_\_\_\_\_ |

**15.)** Write a quadratic function in vertex form for the function whose graph has its vertex

at (-5, 4) and passes through the point (7, 1).