

**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.*
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**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).