**Worksheet 4-2: Graphing Quadratic Relations by Table of Values**

Basic Parabola: $y = x^2$

The most basic parabola is the graph of the quadratic relation $y = x^2$.

All other parabolas are the **transformations** of the basic parabola $y = x^2$.

1. Graph $y = x^2$ by first completing the following table of values.

$y = x^2$

x	$x^2 = y$	(x, y)
3	$3^2 = 9 = y$	$(3, 9)$
2	$2^2 = 4 = y$	$(2, 4)$
1	$1^2 = 1 = y$	$(1, 1)$
0	$0^2 = 0 = y$	$(0, 0)$
−1	$(-1)^2 = 1 = y$	$(-1, 1)$
−2	$(-2)^2 = 4 = y$	$(-2, 4)$
−3	$(-3)^2 = 9 = y$	$(-3, 9)$
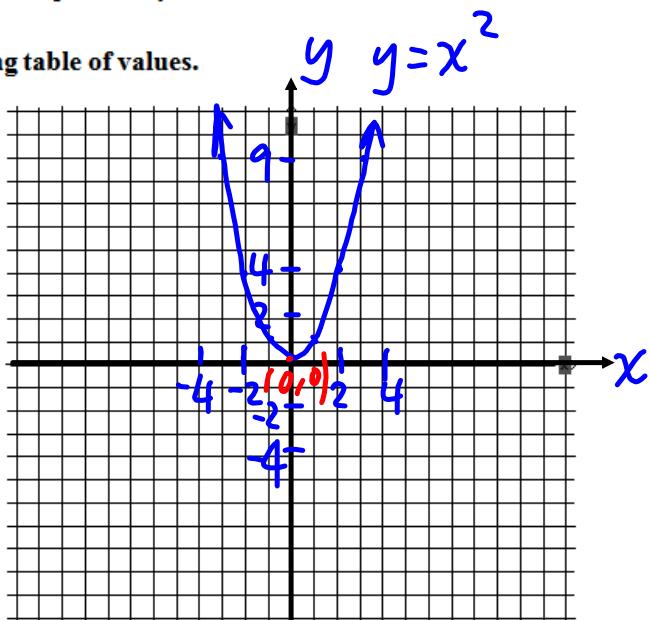
(a) vertex = (0, 0)

(b) It opens upward.

(c) Minimum value = 0

(d) Axis of symmetry: x = 0

2. Graph $y = x^2 - 2x$

X	$x^2 - 2x = y$	(x, y)
4	$(4)^2 - 2(4) = 16 - 8 = 8$	$(4, 8)$
3	$(3)^2 - 2(3) = 9 - 6 = 3$	$(3, 3)$
2	$(2)^2 - 2(2) = 4 - 4 = 0$	$(2, 0)$
1	$(1)^2 - 2(1) = 1 - 2 = -1$	$(1, -1)$
0	$(0)^2 - 2(0) = 0 - 0 = 0$	$(0, 0)$
−1	$(-1)^2 - 2(-1) = 1 + 2 = 3$	$(-1, 3)$
−2	$(-2)^2 - 2(-2) = 4 + 4 = 8$	$(-2, 8)$
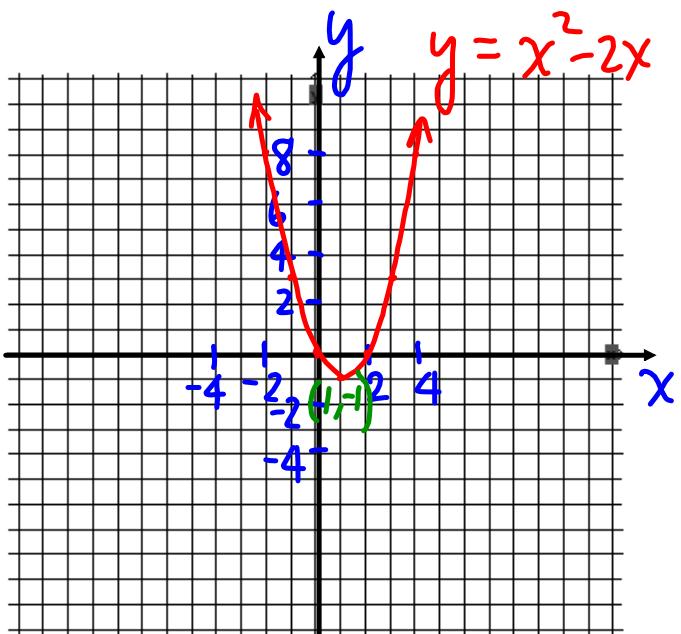
(a) vertex = (1, -1)

(b) It opens upward.

(c) Minimum value = -1

(d) Axis of symmetry: x = 1

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3. **Graph** $y = -x^2$

x	$-x^2 = y$	(x, y)
3	$-(3)^2 = -9$	$(3, -9)$
2	$-(2)^2 = -4$	$(2, -4)$
1	$-(1)^2 = -1$	$(1, -1)$
0	$-(0)^2 = 0$	$(0, 0)$
−1	$-(-1)^2 = -1$	$(-1, -1)$
−2	$-(-2)^2 = -4$	$(-2, -4)$
−3	$-(-3)^2 = -9$	$(-3, -9)$

$y = -x^2$
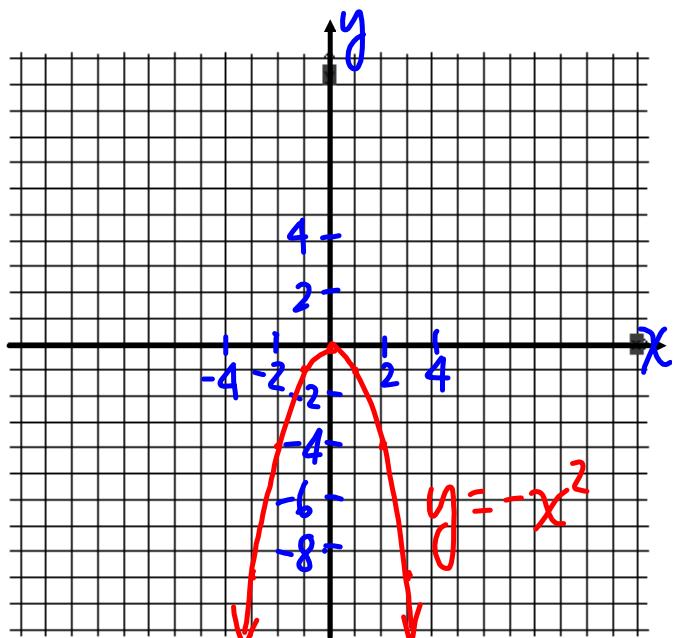
(a) vertex = (0, 0)

(b) It opens downward.

(c) Maximum value = 0

(d) Axis of symmetry: x = 0

4. **Graph** $y = -x^2 + 7$

x	$-x^2 + 7 = y$	(x, y)
3	$-(3)^2 + 7 = -9 + 7 = -2$	$(3, -2)$
2	$-(2)^2 + 7 = -4 + 7 = 3$	$(2, 3)$
1	$-(1)^2 + 7 = -1 + 7 = 6$	$(1, 6)$
0	$-(0)^2 + 7 = 0 + 7 = 7$	$(0, 7)$
−1	$-(-1)^2 + 7 = -1 + 7 = 6$	$(-1, 6)$
−2	$-(-2)^2 + 7 = -4 + 7 = 3$	$(-2, 3)$
−3	$-(-3)^2 + 7 = -9 + 7 = -2$	$(-3, -2)$

$y = -x^2 + 7$
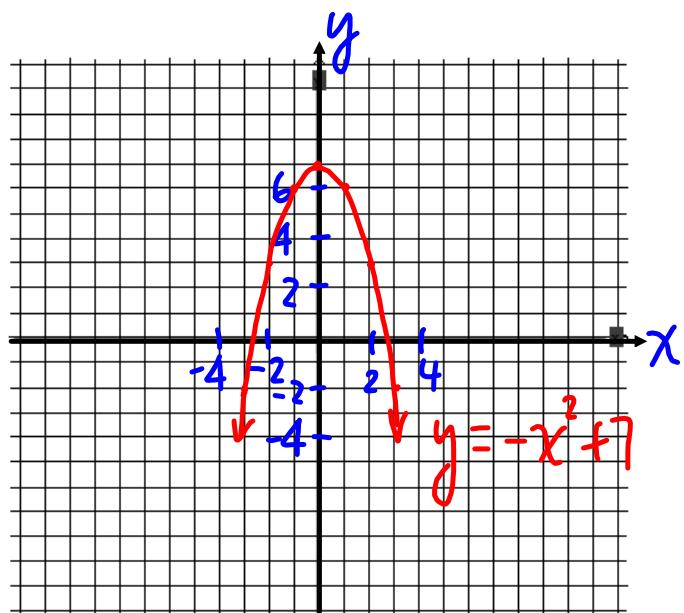
(a) vertex = (0, 7)

(b) It opens downward.

(c) Maximum value = 7

(d) Axis of symmetry: x = 0