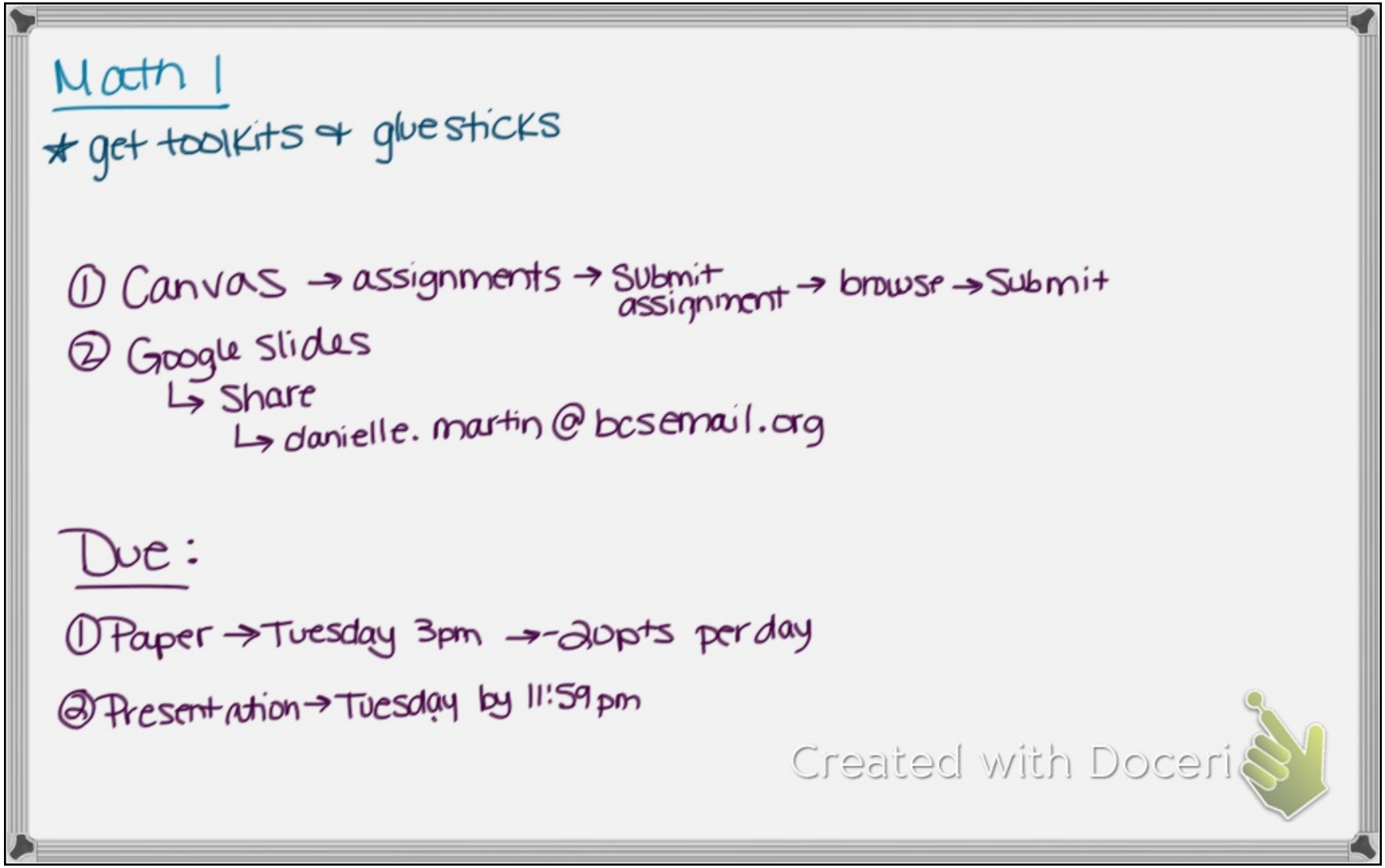
Math 1
★ get toolkits & glue sticks
① Canvas → assignments → Submit assignment → browse → Submit
② Google slides
↳ Share
↳ danielle.martin@bcsemail.org
Due:
① Paper → Tuesday 3pm → -20pts per day
② Presentation → Tuesday by 11:59 pm
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Graphing Quadratic Functions

Quadratic Function: standard form $ax^2 + bx + c$ **sometimes called a** parabola

Vertex: the max or min point of a quadratic function (midpoint) → turning Point

Axis of symmetry: vertical line that goes through the vertex + cuts parabola in half

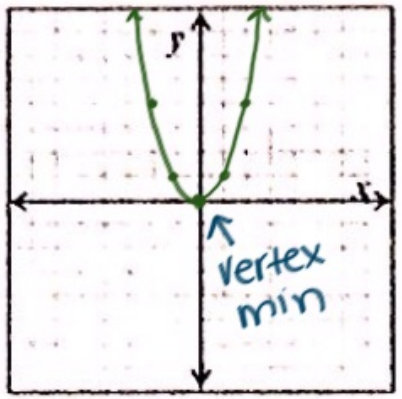
Form: $y = ax^2$. Graph each quadratic function. Label the vertex and axis of symmetry.

1. $y = x^2$

y= and graph

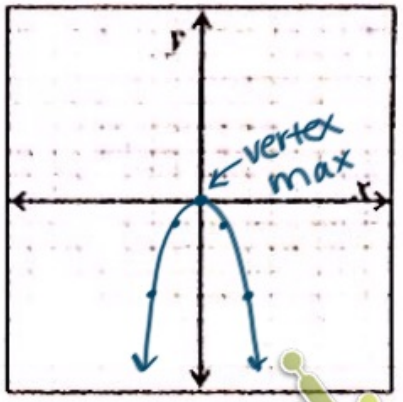
x	y
-2	4
-1	1
0	0
1	1
2	4

vertex turning Point



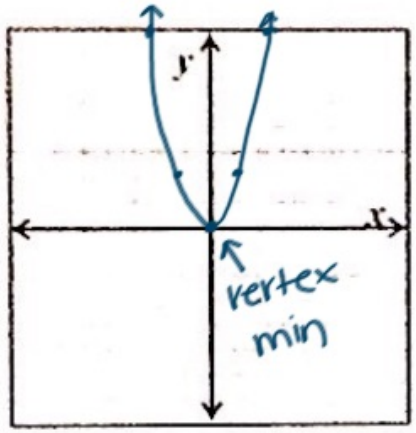
2. $y = -x^2$

x	y
-2	-4
-1	-1
0	0
1	-1
2	-4



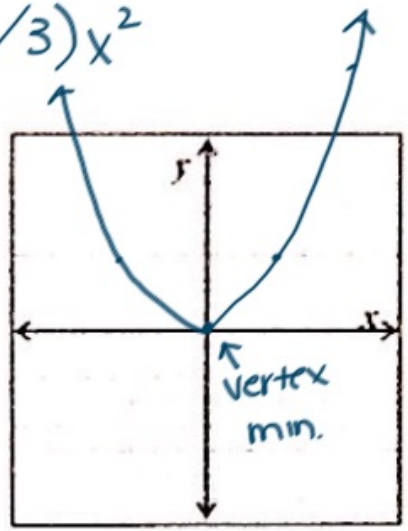
3. $y = 2x^2$

x	y
-2	8
-1	2
0	0
1	2
2	8



4. $y = \left(\frac{1}{3}\right)x^2$ (1/3)x^2

x	y
-6	12
-3	3
0	0
3	3
6	12



4. Compare the graphs from #1 and #2. How are they similar? How do they differ?

same: Shape different: Direction

5. Compare the graphs of #1, #3, and #4. How are they similar? How do they differ?

same: Direction Shape different: width

6. What is the y-intercept of each graph?

(0,0)

Vocabulary:

Domain: x-values that can be used

Range: y-values that are used

Vertex: max or min (turning point + midpoint)

Axis of symmetry: line that goes through the vertex + splits parabola in half

x-intercept: when parabola crosses the x-axis + y-value is 0 (#, 0)

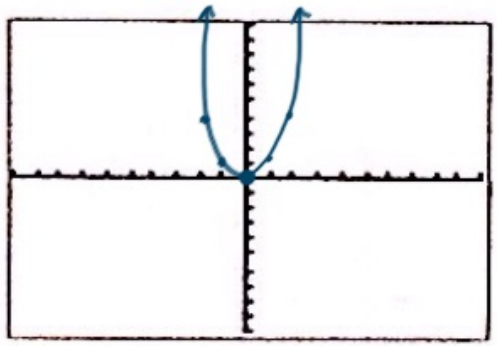
y-intercept: when parabola crosses the y-axis + x-value is 0 (0, #)

left → right

Increasing interval: when x increasing + y increasing

Decreasing interval: when x increasing + y decreasing

Parent Function: $y = x^2$



x	-2	-1	0	1	2
y	4	1	0	1	4

Characteristics:

All Real #'s

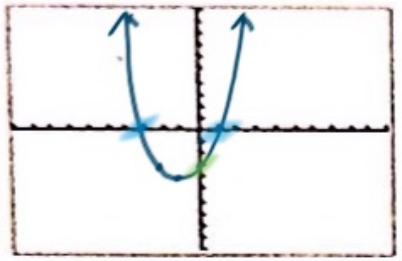
Domain: $(-\infty, \infty)$ Range: $y \geq 0$

Vertex: (0,0) AOS: $x = 0$

X-int: (0,0) Y-int: (0,0)

Inc: $x > 0$ Dec: $x < 0$

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



Characteristics:

Domain: All real #s $(-\infty, \infty)$

Range: $y > -4$

Vertex: $(-1, -4)$

AOS: $x = -1$

X-int: $(-3, 0)$ & $(1, 0)$

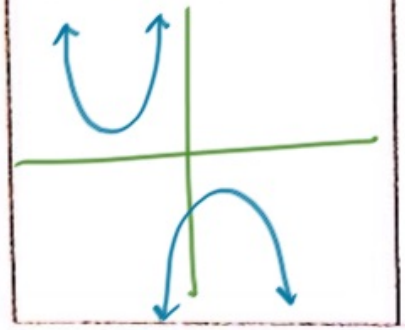
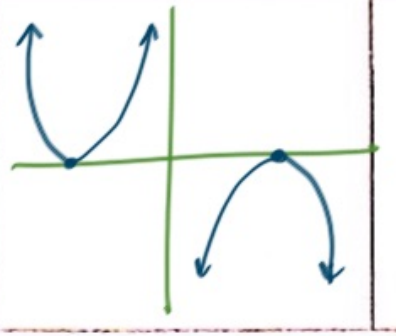
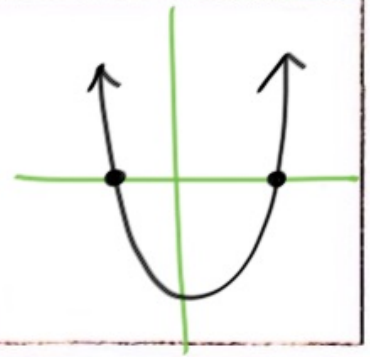
Y-int: $(0, -3)$

Inc: $x > -1$

Dec $x < -1$

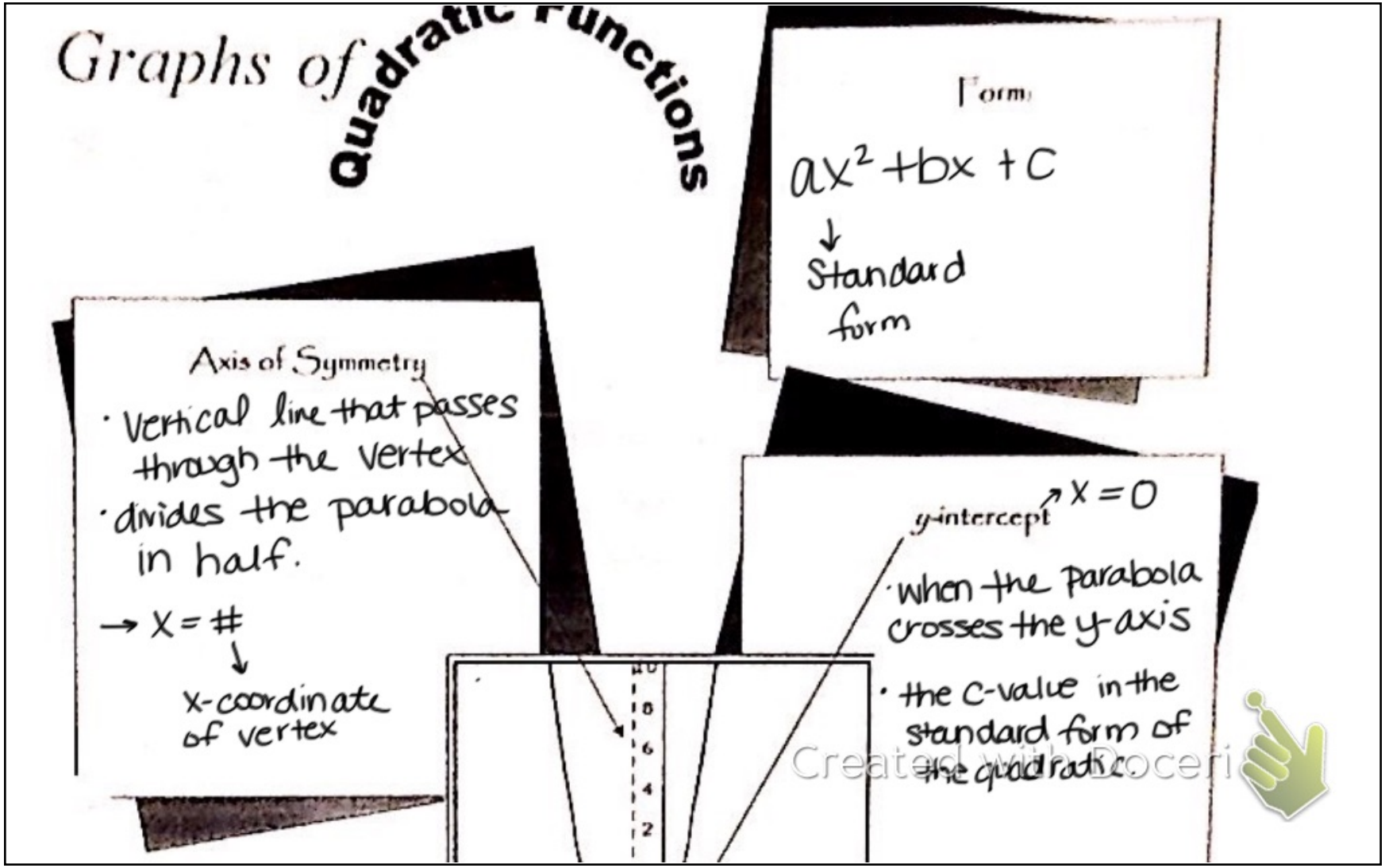
x	-3	-2	-1	0	1
y	0	-3	-4	-3	0

There are 3 possible choices for solutions for quadratic equations: (x-intercepts)

0 Solutions	1 Solution	2 Solutions
		

The domain is always $(-\infty, \infty)$ for quadratic functions.

All real #s


Graphs of Quadratic Functions
Form
ax^2+bx+c
↓
Standard form
Axis of Symmetry
· Vertical line that passes through the vertex
· divides the parabola in half.
→ x = #
↓
x-coordinate of vertex
y-intercept
x = 0
· When the parabola crosses the y-axis
· the c-value in the standard form of the quadratic
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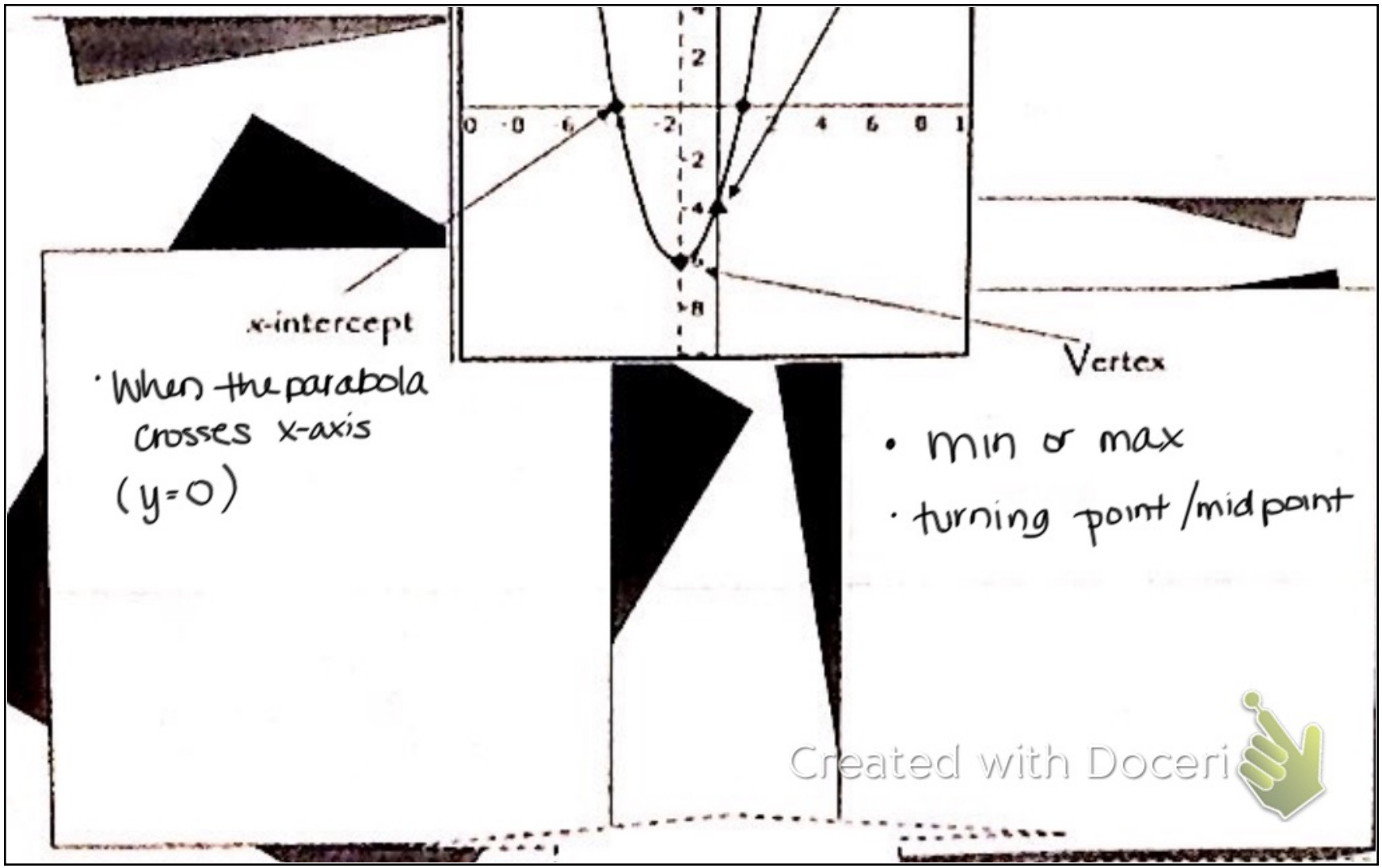
x-intercept
• When the parabola crosses x-axis (y=0)
Vertex
• min or max
• turning point / midpoint
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Graphing Quadratic Functions

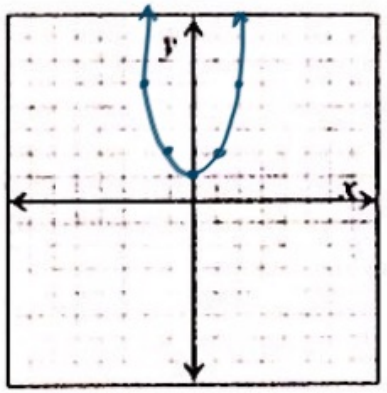
Based on Graphs #1 – 2, we can conclude that for $y = ax^2$:

- If $a > 0$ (↳ positive #), then the parabola will open **up**, the vertex will be **(0,0)** and the axis of symmetry will be **$x = 0$**.
- If $a < 0$ (↳ negative #s), then the parabola will open **down**, the vertex will be **(0,0)** and the axis of symmetry will be **$x = 0$**.

Form: $y = ax^2 + c$.

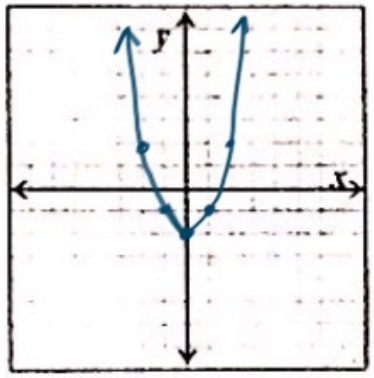
7. $y = x^2 + 1$

x	y
-2	5
-1	2
0	1
1	2
2	5



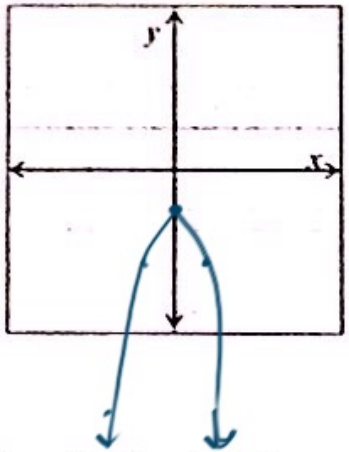
8. $y = x^2 - 2$

x	y
-2	2
-1	-1
0	-2
1	-1
2	2



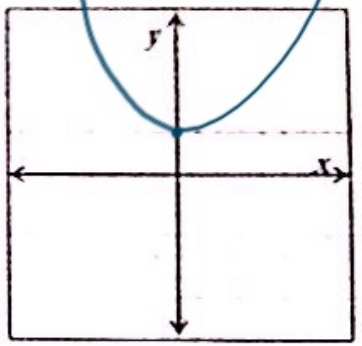
9. $y = -2x^2 - 3$

x	y
-2	-11
-1	-5
0	-3
1	-5
2	-11



10. $y = \frac{1}{3}x^2 + 2$

x	y
-6	14
-3	5
0	2
3	5
6	14



11. Compare the graphs from #1, #7 and #8. How are they similar? How do they differ?

Same shape — #7 is shifted up; #8 is shifted down

12. Compare the graphs from #3 and #9, then #4 and #10. How are they similar? How do they differ?

#3→9 → flipped, shifted down

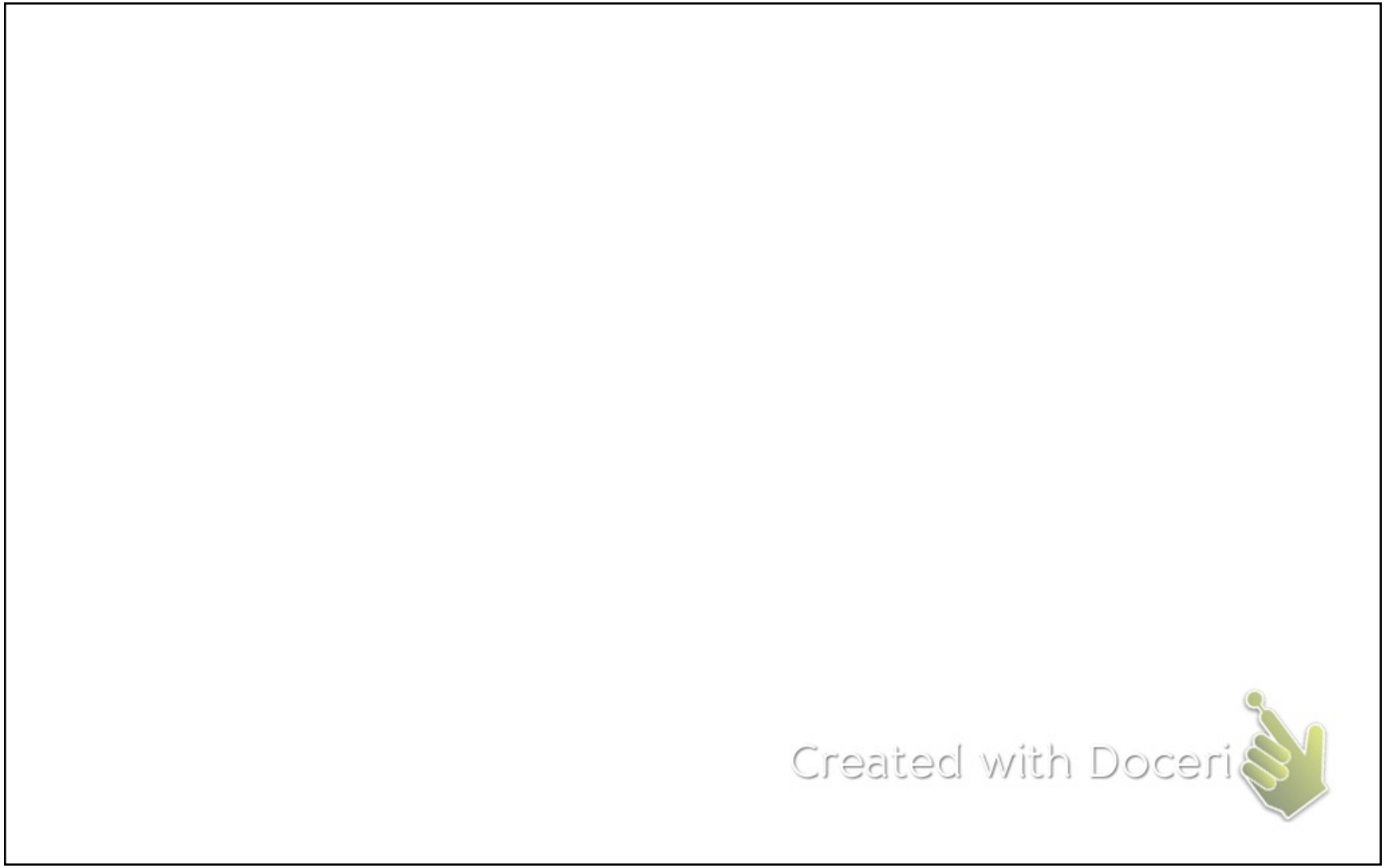
#4→#10 → shifted up, same shirt

13. Find the y-intercept of #7 – 10. Compare the value of c and the y-intercept of each graph.

#7 = (0,1) #8 → (0,-2) #9 → (0,-3) #10 → (0,2)

Based on Graphs #7 – 10, we can conclude that for $y = ax^2 + c$:

- The value of c determines the y-intercept of the graph.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