Quadratic Functions

Identifying a Quadratic Function from a Table

Follow along with Mr. Ward on the front white board.

+2 +2 +2 +2

x	-4	-2	0	2	4
y	8	2	0	2	8

-6 -2 +2 +6

+4 +4 +4

Identifying a Quadratic Function from an Equation

The standard form for a quadratic equation is $y = ax^2 + bx + c$, where a, b, and c are real numbers. (Box that equation!)

When a > 0, the quadratic equation will open upward. (Example: $y = x^2 + 4x$)
When a < 0, the quadratic equation will open downward. (Example: $y = -2x^2 + 1$

Identify (Yes or No) which of the following equations are quadratic functions.

$y = 3 - 2x^2$ Yes $2y = 3x - 6$ No $2x - x^2 = 12$ Yes

Identifying a Quadratic Function from a Graph

Graph the following points on a graph.

x	-3	-2	-1	0	1	2	3
y	9	4	1	0	1	4	9

Now connect those points with a smooth curve.

The points you have just plotted are for the equation $y = x^2$. This is our most basic quadratic equation. Take a quick second to become familiar with this type of shape because all quadratic equations will look very similar to this.

You should now be able to do the following things:

- I can identify a quadratic from its graph.
- I can identify a quadratic from its equation.
- I can identify a quadratic from its table.

Assignment: pg 594 #2-15 (all) and #22-32 (evens)

Mr. Ward Answer Key

pg 594

2. $y + 6x = -14$

NOT a quadratic

no x^2 term

3. $2x^2 + y = 3x - 1$

YES a quadratic

there is an x^2 term

4.

x	-4	-3	-2	-1	0
y	39	18	3	-6	-9

+1 +1 +1 +1

-21 -15 -9 -3

+6 +6 +6

YES a quadratic

the second differences are constant

5.

x	-10	-9	-8	-7	-6
y	15	17	19	21	23

+2 +2 +2 +2

0 0 0

NOT a quadratic

the second differences are not constant

(there are no second differences)

6. $y = 4x^2$

x	y
-2	16
-1	4
0	0
1	4
2	16

See Graph

7. $y = \frac{1}{2}x^2$

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

See Graph

8. $y = -x^2 + 1$

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

See Graph

9. $y = -5x^2$

x	y
-2	-20
-1	-5
0	0
1	-5
2	-20

See Graph

10. $y = -3x^2 + 4x$

downward, $a < 0$

11. $y = 1 - 2x + 6x^2$

upward, $a > 0$

12. $y + x^2 = -x - 2$

$y = -x^2 - x - 2$

downward, $a < 0$

13. $y + 2 = x^2$

$y = x^2 - 2$

upward, $a > 0$

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

$y = 2x^2 - 3$

upward, $a > 0$

15. $y + 2 + 3x^2 = 1$

$y = -3x^2 - 1$

downward, $a < 0$

→

22.

x	-2	-1	0	1	2
y	-1	0	4	9	15

+1 +1 +1 +1

+1 +4 +5 +6

+3 +1 +1

NOT a quadratic
the second differences
are not constant

24.

x	0	1	2	3	4
y	-3	-2	1	6	13

+1 +3 +5 +7

+2 +2 +2

YES a quadratic
the second differences
are constant

26. $y = x^2 - 5$

x	y
-2	-1
-1	-4
0	-5
-1	-4
2	-1

See Graph

28. $y = -2x^2 + 2$

x	y
-2	-6
-1	0
0	2
1	0
2	-6

See Graph

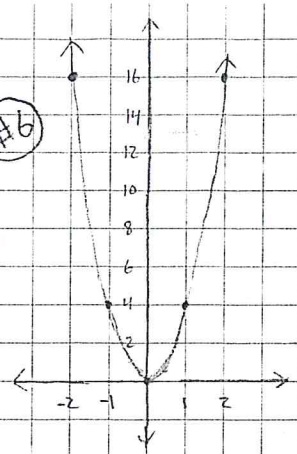
30. $y = 7x^2 - 4x$

upward, $a > 0$

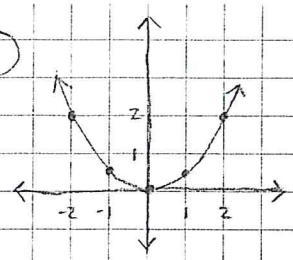
32. $y = -\frac{2}{3}x^2$

downward, $a < 0$

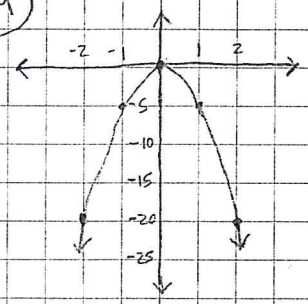
#6


16
14
12
10
8
6
4
2
-2
-1
1
2

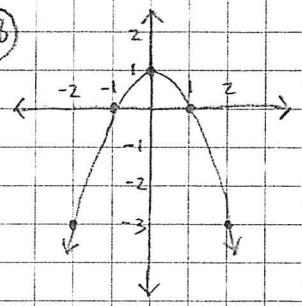
#7


2
1
-2
-1
1
2

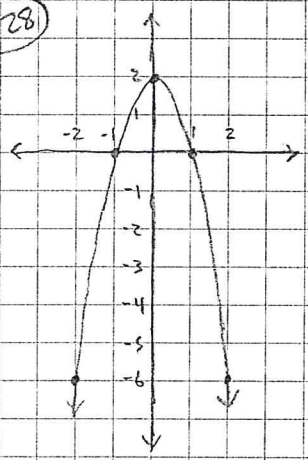
#9


-2
-1
1
2
-5
-10
-15
-20
-25

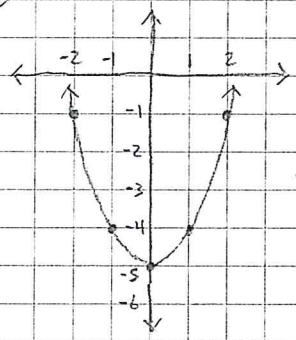
#8


2
1
-2
-1
1
2
-1
-2
-3

#28


2
1
-2
-1
1
2
-1
-2
-3
-4
-5
-6

#26


-2
-1
1
2
-1
-2
-3
-4
-5
-6

Mr. Ward Answer Key

pg 594

16. Vertex = $(-1, 3)$
Max = 3

17. Vertex = $(-3, -4)$
Min = -4

18. Domain : All $\mathbb{R}$ #'s
Range : $y \geq -4$

19. Domain : All $\mathbb{R}$ #'s
Range : $y \leq 4$

20. Domain : All $\mathbb{R}$ #'s
Range : $y \leq 6$

21. Domain : All $\mathbb{R}$ #'s
Range : $y \geq -4$

33. Vertex = $(0, -5)$
Min = -5

34. Vertex = $(1, -3)$
Max = -3

35. Domain : All $\mathbb{R}$ #'s
Range : $y \leq 0$

36. Domain : All $\mathbb{R}$ #'s
Range : $y \geq 2$

37. Domain : All $\mathbb{R}$ #'s
Range : $y \geq -2$

38. Domain : All $\mathbb{R}$ #'s
Range : $y \leq 4$