

4.REV.1 • Quadratic Functions

Find successive rates of change to determine if the function is linear, quadratic, or neither. Identify intervals where the function is increasing and/or decreasing. Is the function concave up, concave down, or neither?

1. $f(x)$

x	$f(x)$	FIRST DIFFERENCES	SECOND DIFFERENCES
-4	-22		
-3	-15	_____	_____
-2	-6	_____	_____
-1	5	_____	_____
0	18		

LINEAR / QUADRATIC / NEITHER

INCREASING INTERVAL: _____ < x < _____DECREASING INTERVAL: _____ < x < _____

CONCAVE UP / CONCAVE DOWN / NEITHER

2. $f(x)$

x	$f(x)$	FIRST DIFFERENCES	SECOND DIFFERENCES
-5	-111		
-3	-35	_____	_____
-1	1	_____	_____
1	-3	_____	_____
3	-47		

LINEAR / QUADRATIC / NEITHER

INCREASING INTERVAL: _____ < x < _____DECREASING INTERVAL: _____ < x < _____

CONCAVE UP / CONCAVE DOWN / NEITHER

For each quadratic function, determine (1) the equation of the axis of symmetry; (2) the coordinates of the vertex; (3) the range; (4) whether the function has a maximum or minimum value, what it is, and where it is located; (5 & 6) the intervals on which it is increasing and decreasing; (7) the x -intercepts; and (8) the y -intercept. **Use algebra to determine these properties.**

3. Standard Form: $f(x) = -2x^2 + 4x + 3$

(1) equation of the axis of symmetry (show work)

(2) the coordinates of the vertex

(3) the range

(4) maximum or minimum?

(5) increasing interval

(6) decreasing interval

Value: _____ location: _____

(7) x -intercepts (show work)(8) y -intercept

4. Intercept Form: $f(x) = (x + 1)(2x - 5)$

- (1) equation of the axis of symmetry (show work) (2) the coordinates of the vertex
- (3) the range
- (4) maximum or minimum? (5) increasing interval (6) decreasing interval
Value: _____ location: _____
- (7) x-intercepts (8) y-intercept

5. Vertex Form: $f(x) = 0.4(x + 12)^2 - 9$

- (1) equation of the axis of symmetry (2) the coordinates of the vertex
- (3) the range
- (4) maximum or minimum? (5) increasing interval (6) decreasing interval
Value: _____ location: _____
- (7) x-intercepts (show work) (8) y-intercept

Identify the function's range and the intervals on which it is increasing and decreasing.

6. The vertex is $(-1, -2)$ and the parabola opens up.
Range:
Increasing:
Decreasing:
7. The vertex is $(-3, -4)$ and the parabola opens down.
Range:
Increasing:
Decreasing:
8. Maximum value of -6 at $x = 10$
Range:
Increasing:
Decreasing:
9. Minimum value of 18 at $x = -6$
Range:
Increasing:
Decreasing:

10. Which expressions are equivalent to $4x^2 - 4x - 120$? Select ALL that apply.

A. $2(2x^2 + 2x - 60)$

B. $4(x^2 - x - 30)$

C. $4(x - 6)(x + 5)$

D. $4(x - 0.5)^2 - 121$

For each quadratic function, find the zeros, if any, and the y -intercept. *If necessary, round to two decimal places.*

11. $q(x) = -3x^2 + 24x - 36$

12. $u(x) = 6x^2 + 30x - 44$

13. $a(x) = -2x^2 + 13x - 15$

14. $d(x) = 0.3(x - 1)^2 - 7.5$

Complete the square and write the quadratic function in vertex form. Then identify the vertex, the equation of the axis of symmetry, whether the graph is concave up or concave down, and the range of the function.

15. $r(x) = 5x^2 + 30x - 10$

16. $a(x) = -4x^2 + 8x - 6$

Write the equation of the parabola described. Use the appropriate form – factored form or vertex form – based on the information provided. Is the parabola concave up or concave down?

17. The parabola has zeros at $x = -1$ & $x = 3$ and a y -intercept of $(0, -9)$.
18. The parabola has a vertex at $(-6, 9)$ and an x -intercept of $(-15, 0)$.
19. The parabola has a y -intercept of $(0, -4)$ and its maximum occurs at $(2, 0)$.
20. The parabola has a vertex of $(6, 5)$ and passes through the point $(10, 8)$.