

OBJECTIVE

1. SWBAT recognize the forms of features of quadratics.

NOTES

WHAT ARE QUADRATICS?

Any **expression, equation, or function** in terms of x , for which 2 is the highest degree of x . (x^2)

EXPRESSION: (no equal sign)

Example: $3x^2 + 2x - 1$

EQUATION: (equal sign)

Example: $3x^2 + 2x = 1$

FUNCTION: (equal sign with y or $f(x)$)

Example: $f(x) = 3x^2 + 2x - 1$

FORM & FUNCTION

Quadratics can be written in three useful forms as follows:

POLYNOMIAL FORM

$$f(x) = ax^2 + bx + c$$

INTERCEPT FORM

$$f(x) = a(x - p)(x - q)$$

VERTEX FORM

$$f(x) = a(x - h)^2 + k$$

What information does each form provide?

The c is the y -intercept: $(0, c)$
The a is the vertical stretch.
The sign of a indicates whether the graphed parabola opens up (+) or down (-).

The p and the q are x -intercepts: $(p, 0)$, $(q, 0)$. In the formula they are negative, so use the opposite.
The a does the same as in polynomial form.

The vertex of the graphed parabola is found at (h, k) . Use the opposite for h . The axis of symmetry is at $x = h$. The a does the same job.

EXAMPLES

1. Which expressions are quadratic? Circle all that qualify.

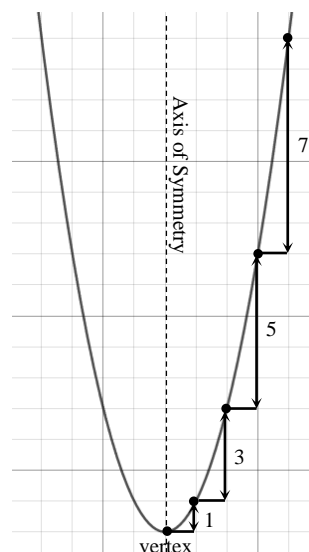
- A) $2x^2 - x$ B) $x(x+3)(x+2)$
C) $6(2x+4) - 9$ D) $(x-5)^2$

2. Identify key features of each quadratic function.

- A) $f(x) = (x-3)(x+5)$
B) $f(x) = -(x-6)^2 + 9$
C) $f(x) = 2x^2 + 12x + 10$

GRAPHING

The graph below illustrates how the parabola of a quadratic function is graphed with NO STRETCHING.



Starting from the vertex, for each horizontal change of 1, the vertical change is a sequence of odd numbers.

The pattern is repeated symmetrically on the other side of the vertex.

If necessary, multiply the odd numbers by a vertical stretch factor a .

Label each expression, equation, or function as Quadratic (Q) or Non-Quadratic (NQ).

1. $x^2 + 8x$

2. $7x^2 = 98 + 2x$

3. $x(x+11)^2 = 1$

4. $y = (x-8)(x+1)(x-2)$

5. $x(x-3) = 0$

6. $f(x) = 2(x-5)^2$

Identify key features of each quadratic function, including: x -intercepts, y -intercept, vertex, & axis of symmetry.

7. $f(x) = x^2 - 2x - 8$

8. $f(x) = x^2 + 8x - 20$

9. $f(x) = 2x^2 + 16x + 14$

10. $f(x) = -(x+1)(x-9)$

11. $f(x) = (x+7)(x+8)$

12. $f(x) = 3(x-10)(x-2)$

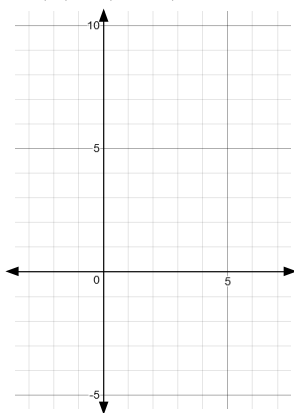
13. $f(x) = (x-2)^2$

14. $f(x) = (x+6)^2 - 1$

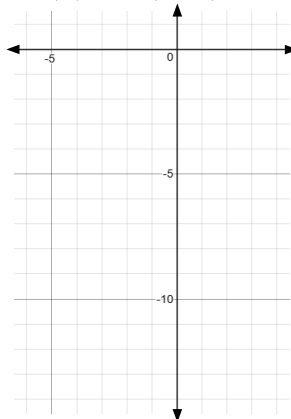
15. $f(x) = -(x-4)^2 + 9$

Graph each quadratic function.

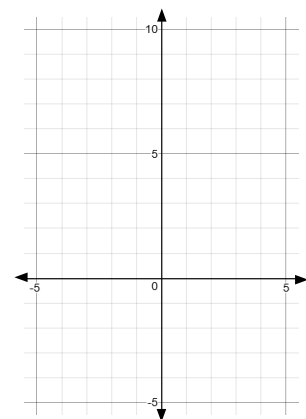
16. $f(x) = (x-2)^2 - 4$



17. $f(x) = -2(x+1)^2 + 1$



18. $f(x) = (x-2)(x+2)$



- ★ 19. Suppose a fidget spinner company has constructed an average cost function $C(x) = 0.05(x-250)^2 + 3$, where $C(x)$ is the average cost per spinner when producing x fidget spinners. Find and interpret the following function features in context: vertex and y -intercept.