

Properties of a Quadratic Function.

Monday, March 9, 2021 11:44 AM

$x^2 + 7x + 12 = 0$ quadratic equation.

$x^2 + 7x + 12 = y$ quadratic function.

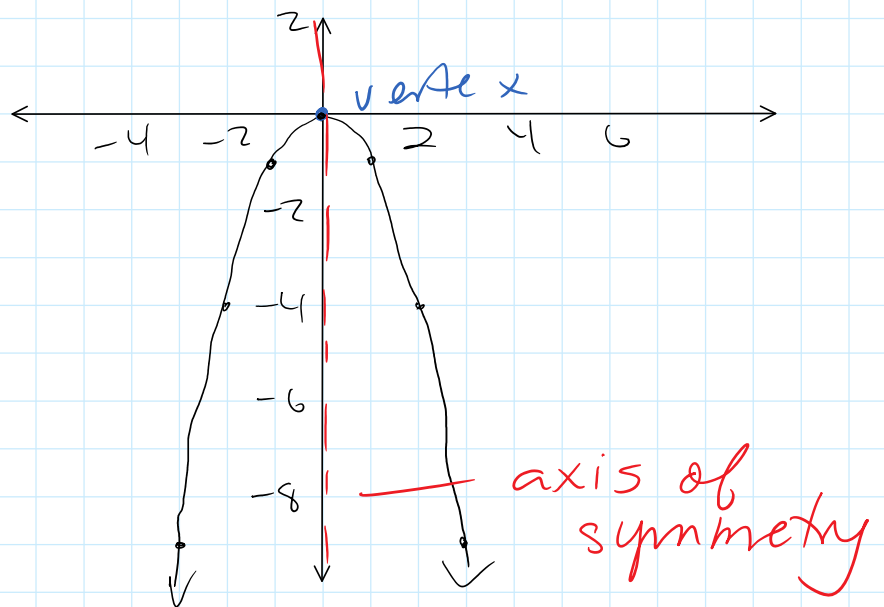
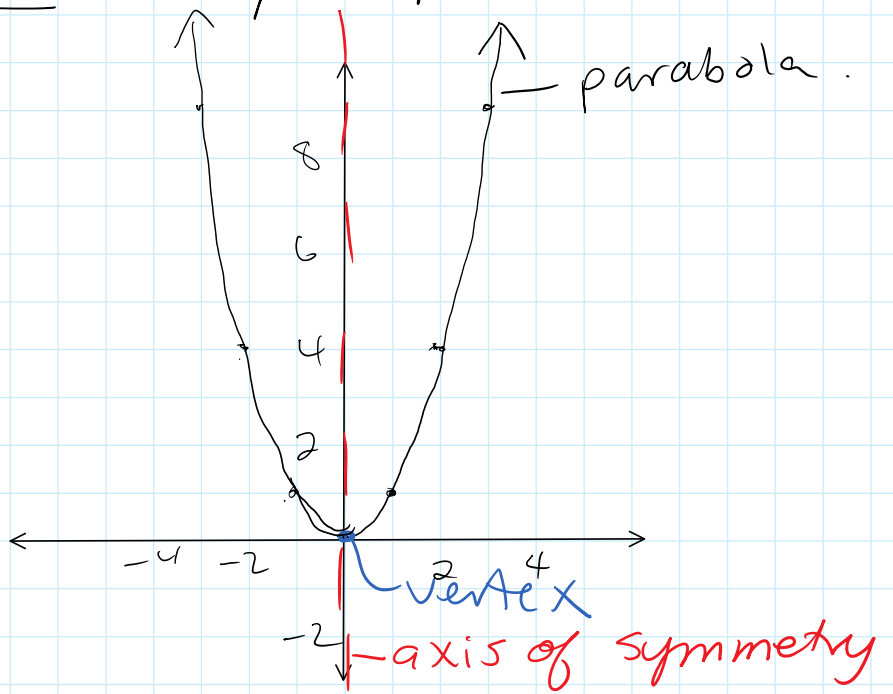
A function is a rule that produces one and only one output number for any valid input number.

$y = x^2$

| x | y |
|----|----|
| 0 | 0 |
| +1 | 1 |
| +1 | 1 |
| +1 | 4 |
| +1 | 9 |
| +1 | 16 |
| -1 | 1 |
| -2 | 4 |
| -3 | 9 |

$y = -x^2$

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



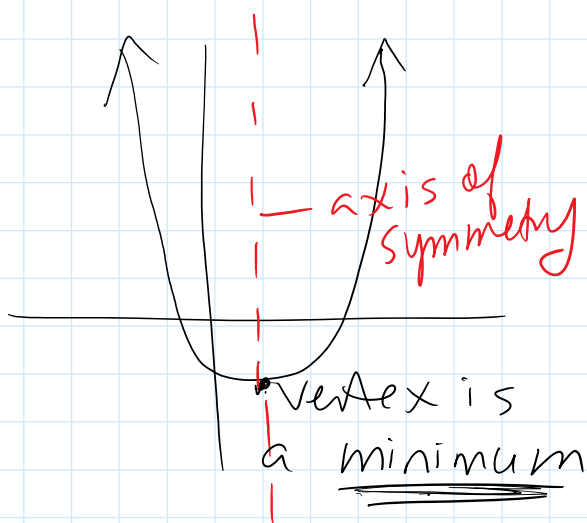
A quadratic function is any function that can be written in the form

$$y = ax^2 + bx + c \text{ where } a, b, c \in \mathbb{R}, a \neq 0$$

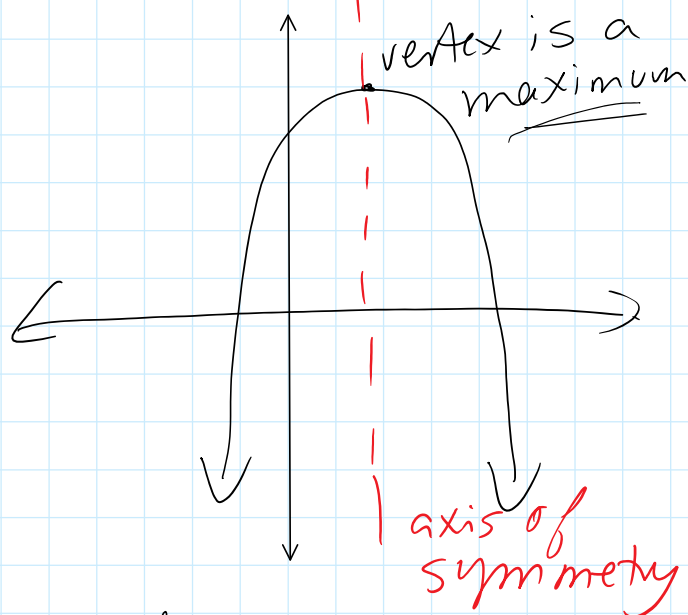
This equation is called the general form of the equation of a quadratic function.

Every quadratic function results in a parabola.

If $a > 0$



If $a < 0$



Domain: all possible values of x .

For a parabola the domain is $x \in \mathbb{R}$.

Range: all possible values of y .

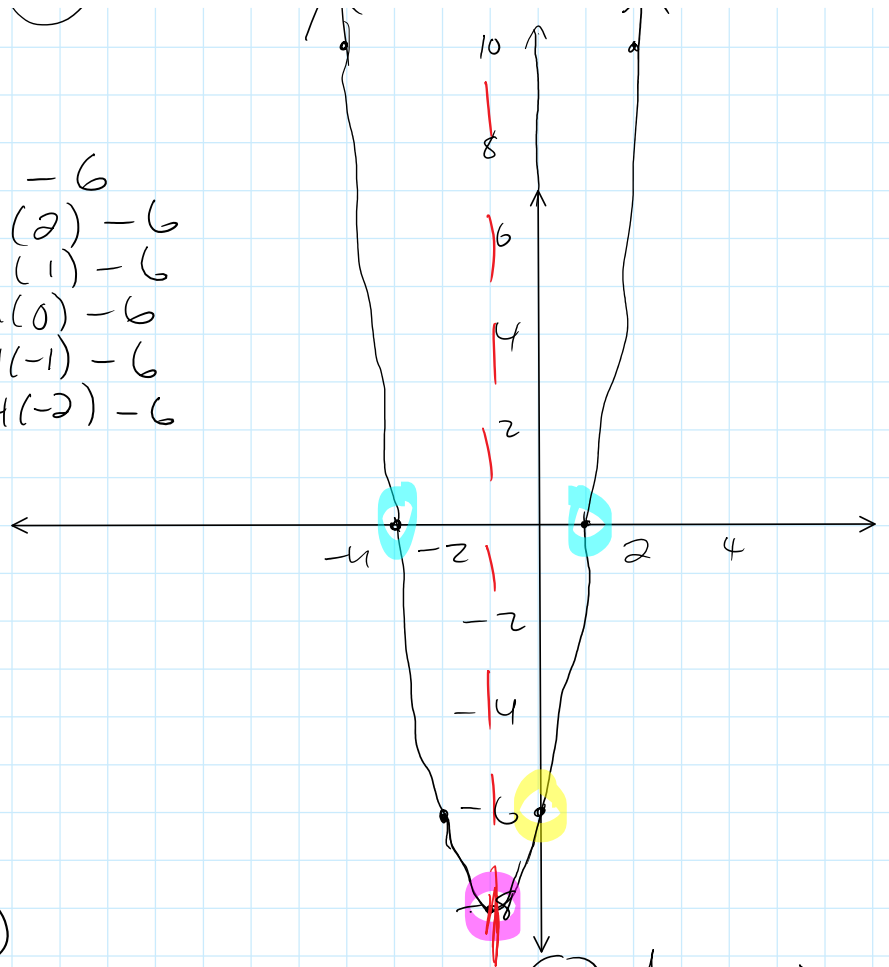
For a parabola the range is

$$y \leq \text{ or } y \geq \text{ the } y \text{ value of the vertex}$$

$$y = 2x^2 + 4x - 6$$

| x | y | Calculation |
|-----|-----|---------------------|
| 4 | 10 | $2(4) + 4(2) - 6$ |
| 1 | 0 | $2(1) + 4(1) - 6$ |
| 0 | -6 | $2(0) + 4(0) - 6$ |
| -1 | -8 | $2(1) + 4(-1) - 6$ |
| -3 | 0 | $2(-4) + 4(-2) - 6$ |

$$\begin{aligned} &+1 \left(\begin{array}{c|c} -1 & -8 \\ \hline -2 & -6 \end{array} \right) + 2 \\ &+1 \left(\begin{array}{c|c} -3 & 0 \\ \hline -4 & 10 \end{array} \right) + 6 \\ &+1 \left(\begin{array}{c|c} -4 & 10 \end{array} \right) + 10 \end{aligned}$$



Find:

① Vertex: $(-1, -8)$

② axis of symmetry $x = -1$

③ y-intercept: $(0, -6)$

④ x-intercept: $(1, 0)$ $(-3, 0)$

⑤ domain $x \in \mathbb{R}$

⑥ range $y \geq -8$

Pg 277-81 # 4-6, 8-12.