

Question 2

Sketch the graph of the function:

$$f(x) = |x + 1| - 2$$

Instructions: Identify the vertex, axis of symmetry, domain, range, and x- and y-intercepts. Then sketch the graph.

Question 2 - Solution

We are given:

$$f(x) = |x + 1| - 2$$

Step 1: Transform the parent function $f(x) = |x|$

- Shift left by 1: $x \rightarrow x + 1$
- Shift down by 2: $f(x) \rightarrow f(x) - 2$

Vertex: The vertex of $f(x) = |x|$ is at $(0, 0)$, so for this function it's at $(-1, -2)$

Axis of Symmetry: $x = -1$

Domain: $(-\infty, \infty)$

Range: $[-2, \infty)$

X-intercepts:

$$|x + 1| - 2 = 0 \Rightarrow |x + 1| = 2 \Rightarrow x + 1 = \pm 2 \Rightarrow x = 1, -3$$

Y-intercept:

$$f(0) = |0 + 1| - 2 = 1 - 2 = -1$$

