

3-6

$$f(x) \begin{cases} 2x+3 & \text{if } x \leq 0 \\ -x-1 & \text{if } x > 0 \end{cases}$$

There are 2 equations to use  
Which one to use is based on  
the value of  $x$

$f(-1)$ , use  $2x+3$        $2(-1)+3$        $f(-1) = 1$

$f(2)$ , use  $-x-1$        $-(2)-1$        $f(2) = -3$

$$\text{Graph } f(x) = \begin{cases} 2x+3 & \text{if } x \leq 0 \\ -x-1 & \text{if } x > 0 \end{cases}$$

① Use  $x$  as one  $x$  for both

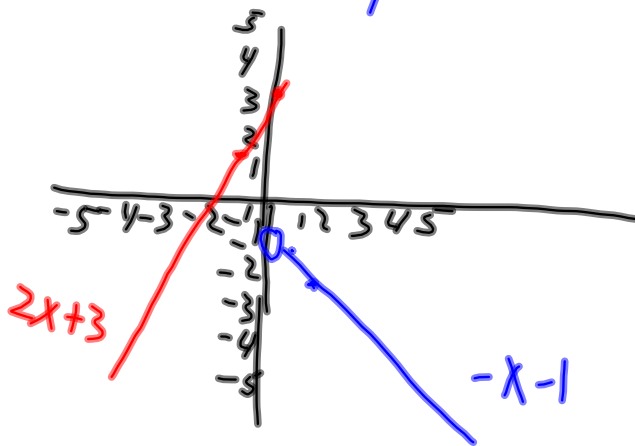
| $x$ | Calculation | $y$ | $(x, y)$  |
|-----|-------------|-----|-----------|
| 0   | $2(0)+3$    | 3   | $(0, 3)$  |
| -1  | $2(-1)+3$   | 1   | $(-1, 1)$ |

closed circle

$-x-1$  if  $x > 0$

| $x$ | Calculation | $y$ | $(x,y)$  |
|-----|-------------|-----|----------|
| 0   | $-0-1$      | -1  | $(0,-1)$ |
| 1   | $-1-1$      | -2  | $(1,-2)$ |

open circle



Graph  $f(x) = x$       Graph  $f(x) = x - 2$   
Explain how the graphs differ.

Called a vertical shift

$y = x$   
 $y = x^2$   
 $y = \{x\}$

} Just  $y$  and  $x$   
called  
parent function.

## Graph absolute value

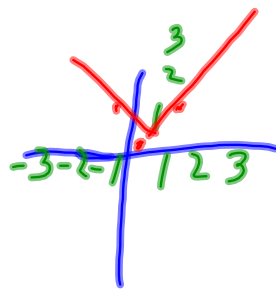
Graph  $y = |x|$

① Find what makes the absolute value = 0. This is your vertex.

$$\begin{array}{c} x \\ \hline 0 \end{array} / \begin{array}{c} y \\ \hline 0 \end{array}$$

② Add 1 and subtract 1 from the x that gives you the vertex.

$$\begin{array}{c|c} x & y \\ \hline 0 & 0 \\ 1 & 1 \\ -1 & -1 \end{array}$$



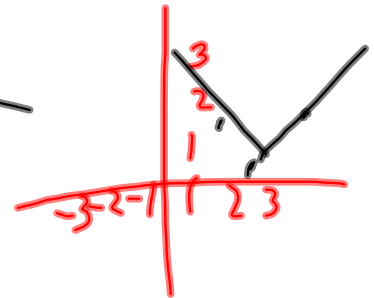
Graph  $g(x) = |x - 2|$



$$g(x) = |x-2|$$

vertex =

| x | Calc      | y | (x,y) |
|---|-----------|---|-------|
| 2 | $ 2-2 =0$ | 0 | (2,0) |
| 1 | $ 1-2 =1$ | 1 | (1,1) |
| 3 | $ 3-2 =1$ | 1 | (3,1) |



Graph)  $y = |x-3| + 4$

$$y = |x-3| + 4$$

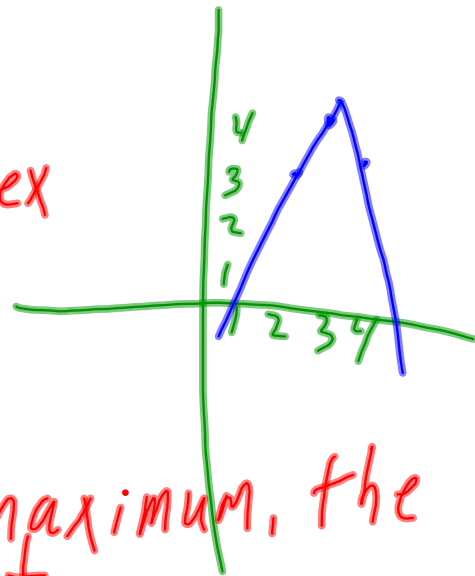
| x | Calc      | y | (x,y)        |
|---|-----------|---|--------------|
| 3 | $ 3-3 +4$ | 4 | (3,4) vertex |
| 2 | $ 2-3 +4$ | 5 | 2,5          |
| 4 | $ 4-3 +4$ | 5 | 4,5          |



vertex is a minimum (the lowest point)

Graph:  $-|x-3|+4$

| x | calc       | y | (x,y)          |
|---|------------|---|----------------|
| 3 | $- 3-3 +4$ | 4 | $(3,4)$ vertex |
| 2 | $- 2-3 +4$ | 3 | 2,3            |
| 4 | $- 4-3 +4$ | 3 | 4,3            |



vertex is a maximum, the highest point.