# KEY FEATURES OF ABS VAL FUNCTIONS

Fill out the chart.

<table>
<thead>
<tr>
<th>EQUATION</th>
<th>OPEN</th>
<th>VERTEX (initial point)</th>
<th>SHIFT (vertical/horizontal)</th>
<th>VERTICAL CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = 3</td>
<td>x+1</td>
<td>-2$</td>
<td>Up Down</td>
<td>$(-1, -2)$</td>
</tr>
<tr>
<td>$y =</td>
<td>x-4</td>
<td>+1$</td>
<td>Up Down</td>
<td>$(4, 1)$</td>
</tr>
<tr>
<td>$y = -</td>
<td>x</td>
<td>+9$</td>
<td>Up Down</td>
<td>$(0, 9)$</td>
</tr>
<tr>
<td>$y = -</td>
<td>x-2</td>
<td>$</td>
<td>Up Down</td>
<td>$(2, 0)$</td>
</tr>
<tr>
<td>$y = \frac{4}{3}</td>
<td>x-5</td>
<td>$</td>
<td>Up Down</td>
<td>$(5, 0)$</td>
</tr>
</tbody>
</table>

Choose two of the functions above to graph. (multiple answers)

6. Function: $y = 3|x+1|-2$

7. Function: $y = |x-4|+1$
1. Sketch at 3 different absolute value graphs that have the same domain and range. Then write the equation of each graph.

\[
\begin{align*}
y &= \frac{1}{|x-4|} - 6 \\
y &= \frac{2}{|x|} - 6 \\
y &= \frac{1}{|x+8|} - 6
\end{align*}
\]

2. Then write a possible equation of each graph.

What is the common domain and range? D: (-\infty, \infty)  
R: [-6, \infty)

3. Are your functions increasing and decreasing over the same intervals? Why/Why not?

First Graph’s Increasing Interval: (4, \infty)  
First Graph’s Decreasing Interval: (-\infty, 4)

4. Given any absolute value function, create and describe a rule to determine the correct end behavior.

If the graph opens up:
As \( x \to -\infty \), \( f(x) \to \infty \) 
As \( x \to \infty \), \( f(x) \to \infty \)

If the graph opens down:
As \( x \to -\infty \), \( f(x) \to -\infty \) 
As \( x \to -\infty \), \( f(x) \to -\infty \)