### Partner Activity

**Names: ______________________**

<table>
<thead>
<tr>
<th>Partner A</th>
<th>Partner B</th>
</tr>
</thead>
</table>
| **1.** Determine whether the graph of the relation is symmetric with respect to the x-axis, the y-axis, the line \( y = x \), the line \( y = -x \) or the origin. Then, state whether the relation is even, odd, or neither.  
\[
\frac{x^2}{25} + \frac{y^2}{9} = 1
\]
| The graph of the relation is symmetric with respect to **the x-axis, the y-axis and the origin** and is both even and odd. |
| **2.** Determine if the equation,  
\[
y = \begin{cases} 
  x + 2, & x \leq -2 \\
  x - 2, & x \geq 2 
\end{cases}
\]
is symmetric with respect to the x-axis, the y-axis, the line \( y = x \), the line \( y = -x \) or the origin. Then, state whether the relation is even, odd, or neither.  
\[
y = x + 2, \ x \leq -2
\]
| The graph of the relation is symmetric with respect to **the origin and is odd**. |
| **1.** Determine whether the graph of the relation is symmetric with respect to the x-axis, the y-axis, the line \( y = x \), the line \( y = -x \) or the origin. Then, state whether the relation is even, odd, or neither.  
\[
y^2 = \frac{4x^2}{9} - 4
\]
| The graph of the relation is symmetric with respect to **the x-axis, the y-axis and the origin** and is both even and odd. |
| **2.** Determine if the equation,  
\[
y = \begin{cases} 
  |x| + 2, & x \geq 0 \\
  -|x| - 2, & x < 0 
\end{cases}
\]
is symmetric with respect to the x-axis, the y-axis, the line \( y = x \), the line \( y = -x \) or the origin. Then, state whether the relation is even, odd, or neither.  
\[
y = |x| + 2
\]
| The graph of the relation is symmetric with respect to **the x-axis, the y-axis and the origin** and is both even and odd. |
3. Complete the values in each table so the relation is symmetric with respect to the $x$-axis, the $y$-axis, or the line $y = x$. Then, state whether the relation is even, odd, or neither.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
<th>$x$</th>
<th>$y$</th>
<th>$x$</th>
<th>$y$</th>
<th>$x$</th>
<th>$y$</th>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-3$</td>
<td>$-1$</td>
<td>$-3$</td>
<td>$-1$</td>
<td>$-3$</td>
<td>$-1$</td>
<td>$-3$</td>
<td>$-1$</td>
<td>$-3$</td>
<td>$-1$</td>
</tr>
<tr>
<td>$-2$</td>
<td>$-1/2$</td>
<td>$-2$</td>
<td>$-1/2$</td>
<td>$-2$</td>
<td>$-1/2$</td>
<td>$-2$</td>
<td>$-1/2$</td>
<td>$-2$</td>
<td>$-1/2$</td>
</tr>
<tr>
<td>$-1$</td>
<td>$-1/2$</td>
<td>$-1$</td>
<td>$-1/2$</td>
<td>$-1$</td>
<td>$-1/2$</td>
<td>$-1$</td>
<td>$-1/2$</td>
<td>$-1$</td>
<td>$-1/2$</td>
</tr>
<tr>
<td>$-3$</td>
<td>$1$</td>
<td>$3$</td>
<td>$-1$</td>
<td>$1$</td>
<td>$-1$</td>
<td>$3$</td>
<td>$-1$</td>
<td>$1$</td>
<td>$-1$</td>
</tr>
<tr>
<td>$-2$</td>
<td>$1/2$</td>
<td>$2$</td>
<td>$-1/2$</td>
<td>$2$</td>
<td>$-1/2$</td>
<td>$2$</td>
<td>$-1/2$</td>
<td>$2$</td>
<td>$-1/2$</td>
</tr>
<tr>
<td>$-1$</td>
<td>$1/2$</td>
<td>$1$</td>
<td>$-1/2$</td>
<td>$1$</td>
<td>$-1/2$</td>
<td>$1$</td>
<td>$-1/2$</td>
<td>$1$</td>
<td>$-1/2$</td>
</tr>
</tbody>
</table>

Odd, even or neither? **neither**  
Odd, even or neither? **odd**  
Odd, even or neither? **neither**

4. Solve $5 - 3|4 - 2x| = -4$.

$x = \frac{1}{2} \cdot \frac{7}{2}$

4. Solve $5 - 3|4 - 2x| < -4$.

$x < \frac{1}{2}, x > \frac{7}{2}$
5. Rewrite \( f(x) = 4 + 3|2 - x| \) in vertex form.

\[
f(x) = 3|x - 2| + 4
\]

Graph the parent graph of \( f(x) = |x| \). Graph and describe the transformation of \( f(x) = 4 + 3|2 - x| \).

The parent graph has shifted right 2 units, up 4 units and has a growth factor of 3.

5. Rewrite \( f(x) = 5 - 2|3 - 4x| \) in vertex form.

\[
f(x) = -8\left|x - \frac{3}{4}\right| + 5
\]

Graph the parent graph of \( f(x) = |x| \). Graph and describe the transformation of \( f(x) = 5 - 2|3 - 4x| \).

The parent graph has been shifted right \( \frac{3}{4} \) units, up 5 units, reflected down and had a growth factor of 8.

6. Rewrite \( f(x) = 4 + 3|2 - x| \) as a piecewise function. Check your equation with the graph above. Do they agree?

\[
f(x) = \begin{cases} 
-3x + 10, & x \leq 2 \\
3x - 2, & x \geq 2 
\end{cases}
\]

6. Rewrite \( f(x) = 5 - 2|3 - 4x| \) as a piecewise function. Check your equation with the graph above. Do they agree?

\[
f(x) = \begin{cases} 
8x - 1, & x \leq \frac{3}{4} \\
-8x + 11, & x \geq \frac{3}{4} 
\end{cases}
\]
7. Write an example of an absolute value equation or inequality that has no solution. Explain why it has no solution.

One possible answer is $|3x| = -5$.

Distance cannot be negative.

7. Write an example of an absolute value equation or inequality that has all real numbers as its solution. Explain why it has a solution of all real numbers.

One possible answer is $|5x - 2| > 0$.

Distance will always be positive.

8. Graph

$$f(x) = \begin{cases} (x - 3)^2 - 2 & \text{if } x > 1 \\ 4x + 2 & \text{if } x \leq 1 \end{cases}$$

9. Find $f(-1)$ if

$$f(x) = \begin{cases} (x - 3)^2 - 2 & \text{if } x > 1 \\ 4x + 2 & \text{if } x \leq 1 \end{cases}$$

$f(-1) = -2$

9. Find $f(0)$ if

$$f(x) = \begin{cases} (x + 1)^2 + 3 & \text{if } x > 2 \\ 5 - x & \text{if } x \leq 2 \end{cases}$$

$f(0) = 5$
10. Rewrite $|4-3x| < y$ in vertex form.

$$3 \left| x - \frac{4}{3} \right| < y$$

Graph $|4-3x| < y$.

10. Rewrite $5 - (x+1)^2 < y$ in vertex form.

$-(x+1)^2 + 5 < y$

Graph $5 - (x+1)^2 < y$.

11. Without using a graphing calculator, graph $y = (3-x)^2 + 2$. Then find and graph its inverse.

$f(x) = (3-x)^2 + 2$

$f^{-1}(x) = 3 \pm \sqrt{x-2}$

11. Without using a graphing calculator, graph $y = -2(x+1)^3 + 3$. Then find and graph its inverse.

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

$f^{-1}(x) = -1 - \frac{3}{2} \sqrt{x-3}$
12. Find the inverse of the relation shown below.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

12. Find the inverse of the relation shown below.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>-4</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

13. Sketch the graph of the inverse of the function shown below.

[Graph of a function showing two lines meeting at a point]

13. Sketch the graph of the inverse of the function shown below.

[Graph of a function showing two lines meeting at a point]