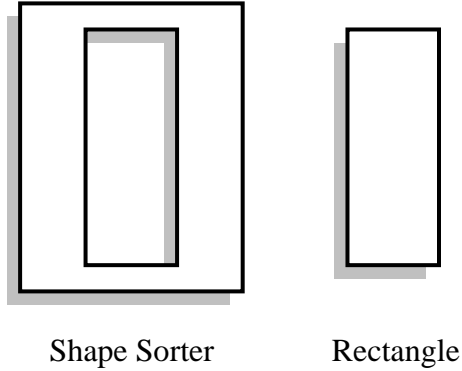


# Rectangle Algebra

NAME \_\_\_\_\_

On the last page of this worksheet, carefully cut along the dotted lines of the rectangle. Keep the rest of the page intact. When you are done cutting, you should have two pieces that look like this:

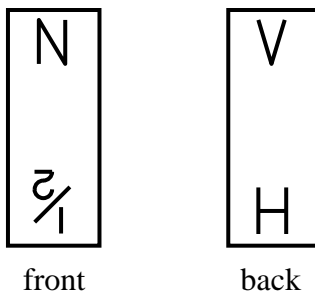


There are four different moves that you will perform with the rectangle. If you start with the rectangle placed in the shape sorter, the rectangle will completely fill the hole after any of these moves is performed.

- N**..... do nothing
- $\frac{1}{2}$  ..... one-half turn in a clockwise direction
- V**..... rotation about the vertical axis
- H** ..... rotation about the horizontal axis

Place an **N** at the top front of the rectangle. This represents a “do nothing” move. When performing any move in this activity, begin with the **N** at the top front. This is the “original position.”

The other labels mark the top front after a move has been made from the original position. Therefore,  $\frac{1}{2}$  appears at the end opposite the **N**, indicating the top front after a 180° rotation about the center of the rectangle; the **V** is at the same end as the **N** but on the other side, indicating a rotation about the vertical axis; and, the **H** is at the end opposite the **V**, indicating a rotation about the horizontal axis. With all labels in place, your rectangle should look like this:



Start with the rectangle in original position — that is, in the shape sorter with the N at the top front.

The symbol # means “followed by,” so the expression  $\frac{1}{2}$  # V means to do a first move of a one-half turn followed by a second move of a rotation about the vertical axis. What is the result; that is, what letter is at the top front after these two moves? In the chart below, indicate the result in the appropriate square.

Now, perform all possible combinations of first moves followed by second moves to complete the entire chart.

		2 <sup>ND</sup> MOVE				
		#	$\frac{1}{2}$	V	H	N
1 <sup>ST</sup> MOVE	$\frac{1}{2}$					
	V					
	H					
	N					

1. What is  $\frac{1}{2}$  # V?
2. What is H # H?
3. What is (H # V) # ( $\frac{1}{2}$  # N)?
4. What happens when the second move is the same as the first move?
5. What happens if either move is N?

