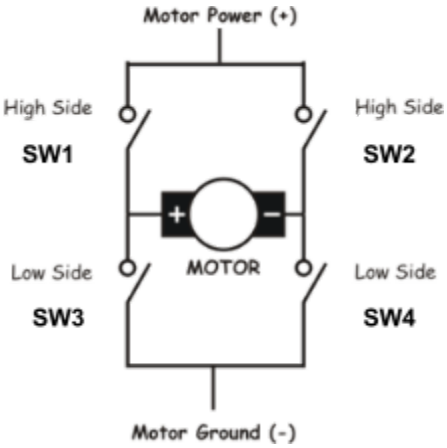
Name: _____ Date: _____

# Brake Challenge

## Introduction




The motors on the RedBot are driven and controlled by a device called an H-Bridge. An H-Bridge is a fancy set of 4 transistors (electronic switches) that allows us to control the direction the motors spin. In the diagram to the right, when SW1 and SW4 are closed, the motor spins in the clock-wise (CW) direction. If SW2 and SW3 are closed, the motor spins in the counter clock-wise (CCW) direction.

These switches are really just transistors. The reason why we use transistors is because they are really fast. We can flip them on and off in under a millisecond! Using Arduino, we can use a **pulse width modulated** signal (PWM) to vary the amount of time the switch is closed compared to the time it is open. Doing this, we can effectively control the speed of the motor!

With the 4 switches, there are other combinations that are beneficial for robotics. If we close SW1 and SW2, the motor is short-circuited to itself. When you try spinning the motor, the motor generates current that feeds back into itself and causes the motor to **BRAKE**. The same is true if you close SW3 and SW4.

What happens if you close SW1 and SW3? Or, if you closed SW2 and SW4?

## Testing and Experimentation

How does braking compare to "coasting"? When you use the command `motors.stop();`, the motors simply turn off and coast to a stop. Try changing the code from the previous example to `motors.brake();`. How far does the RedBot coast? What question / investigation might we ask?

**Task: Devise an experiment to find a relationship between _____**

**_____.**

**Remember, be sure to write down all of your assumptions, controlled variables, as well as your independent and dependant variables.**

As with all previous labs, be sure to start with a data table. What variables are you going to change? What will be your independent variable and what will be your dependant variable?