

# HEXBUGS

*Lesson Plan for Grade 4, Physical Science*

*Prepared by Las Pumas 2197*

## OVERVIEW & PURPOSE

Students will build miniature robots (Hexbugs) by utilizing a battery and a vibrating motor.

## EDUCATION STANDARDS

1. 4.PS.4 Describe and investigate the different ways in which energy can be generated and/or converted from one form of energy to another form of energy.
2. 4.PS.5 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

## OBJECTIVES

1. Understand how electricity creates movement
2. Understand how electricity flows through a closed circuit
3. Understand how machines can be made to mimic nature

## MATERIALS NEEDED (CLASS OF 30)

1. Watch battery (30)
2. Mini vibrating motor disk (30)
3. Toothbrush head (30)
4. Roll of double sided foam tape

## VERIFICATION

*I can...*

1. Understand why the wires need to be touching a certain side of the battery.
2. Explain how the energy in the battery is transformed into different forms of energy
3. Describe the difference between potential and kinetic energy

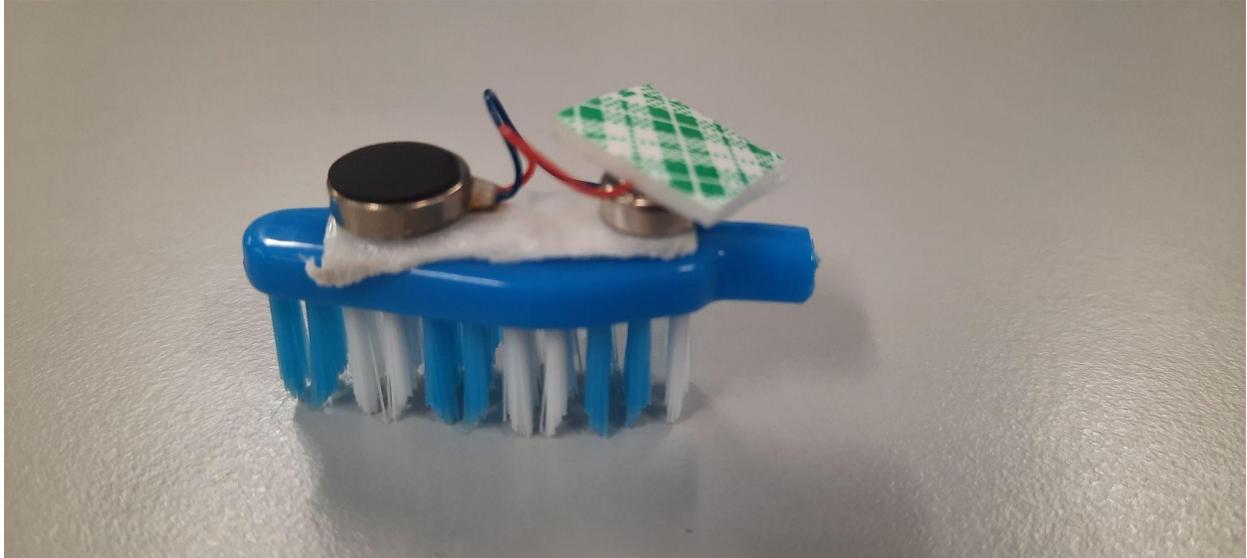
## ACTIVITY

1. Take a toothbrush head and attach a rectangle of double sided foam tape to the back of the head so that the back is completely covered.
2. Peel off the backing of the tape and attach the vibrating motor and the battery on opposite ends of the toothbrush head. The wires of the motor should point towards the battery, and the bump on one flat edge of the battery should be pointed up.
3. Tuck the blue wire on the vibrating motor between the battery and the tape and place the red wire on the vibrating motor on top of the battery.
4. Place another piece of tape on top of the red wire to hold it in place. The toothbrush should vibrate and move when placed on its bristles. To stop, simply remove the red wire.

## EXPLANATION

The battery and motor combination creates a simple electrical circuit. There is chemical potential energy stored inside the batteries. When the wires on the motor are connected to the battery, the energy can flow through the wires because they are conductors. The blue wire is negative and the red wire is positive so the blue must touch the positive end of the battery and red the negative because opposites must attract to allow this flow of electricity to happen. The chemical energy flows through the wires into the battery where it is converted to kinetic energy, which is why the Hexbug can move. If the circuit is not closed (both wires are touching the proper ends of the battery) then the bug can not move, since there will be no flow of electricity.

## FINISHED EXAMPLE



## TEAM INFO

Las Pumas 2197 is a FIRST Robotics team based out of New Prairie High School in New Carlisle, IN. We strive to make STEM education accessible to all. Visit our website at [laspumas2197.org](http://laspumas2197.org) to learn more about our team and find more lesson plans.