

# PaperBot Series

## HexaBot Activity

Subject: Science & Technology

Grade Level: 3 - 5

Topic: Build a HexaBot that implements motors and linkages, allowing for movement of the robot.

Activity Time: 2 hours

Goals	Students will be able to: <ol style="list-style-type: none"><li>1. Advanced knowledge of assembly techniques.</li><li>2. Advanced knowledge of motors and linkages.</li><li>3. Knowledge of transfer of motion.</li><li>4. An increased knowledge of support structures.</li></ol>
Objectives	Create a walking HexaBot using cardstock, straws, motors, and linkages by following the attached assembly instructions.
Materials	Cardstock, brass fasteners, straws, tape, scissors, hole punch, 1 motor, 1 battery pack, axle rod.
Introduction	Introduction topics: <ol style="list-style-type: none"><li>1. Motors</li><li>2. Linkages</li><li>3. Support Structures</li></ol>
Procedure	<ol style="list-style-type: none"><li>1. Introduce activity and show students pictures of HexaBot</li><li>2. Split students into teams of two or three</li><li>3. Distribute materials and assembly instruction sheet. (Forthcoming)</li><li>4. The assembly instructions should be followed closely to ensure a HexaBot that performs correctly.</li><li>5. Make sure students have tested the functionality of their HexaBot upon assembly completion.</li><li>6. After all students have finished their PaperBots the class should reconvene and discuss the activity.</li></ol>
Wrap-up	Suggested discussion points: <ol style="list-style-type: none"><li>1. What did you learn while assembling the HexaBot?</li><li>2. What did you struggle with during the assembly?</li><li>3. What other objects have motors? How are motors used in these products?</li><li>4. How can we modify the HexaBot to do more tasks?</li></ol>

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### Educational Standards:

#### Massachusetts State Standards for Educational Framework – Science – Grade 5

- MA.PS.4 → Identify the basic forms of energy (light, sound, heat, electrical, and magnetic). Recognize that energy is the ability to cause motion or create change.
- MA. PS.5 → Give examples of how energy can be transferred from one form to another.
- MA.PS.6 → Recognize that electricity in circuits requires a complete loop through which an electrical current can pass, and that electricity can produce light, heat, and sound.
- MA.T/E.1.2 → Identify and explain the appropriate materials and tools (e.g., hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) to construct a given prototype safely.
- MA.T/E.1.3 → Identify and explain the difference between simple and complex machines, e.g., hand can opener that includes multiple gears, wheel, wedge gear, and lever.
- MA.T/E.2.3 → Identify relevant design features (e.g. size, shape, weight) for building a prototype of a solution to a given problem