

Pinwheel Rocket:

Understanding Structures and Mechanisms - Flight

Introduction: With this project students will develop an understanding of the action-reaction principle described in Newton's Third Law of Motion.

Prior Knowledge and Skills Students will need to be familiar with in order to complete this activity:

- The definition of a pinwheel and a rocket.
- One property of air is its ability to exert a force when compressed.
- Challenges faced by children with limited mobility.

Materials: Wooden pencil with an eraser on one , Sewing pin. Party balloon , Flexible, Drinking straw, Tape

Scenario: Young children have always been fascinated with pinwheels. They enjoy blowing air over the pinwheel and watching it spin. They run and try to make it spin as fast as possible. The faster it spins the more they enjoy the activity. For children with mobility issues this simple pleasure can often be very difficult to perform. Your task is to design and construct a balloon- powered pinwheel. The faster the pinwheel spins the more exciting it will be for the children.

Design Specifications:

The pinwheel must be made using only the materials provided.

Instructions To Building a Pinwheel Rocket

- Inflate the balloon to stretch it out a bit.
- Slip the nozzle end of the balloon over the end of the straw farthest away from the bend. Use a short piece of plastic tape to seal the balloon to the straw. The balloon should inflate when you blow through the straw.
- Bend the opposite end of the straw at a right angle.
- Lay the straw and balloon on an outstretched finger so that it balances and mark the balance point. Push the pin through the straw at the balance point and then continue pushing the pin into the eraser of the pencil and finally into the wood itself.
- Spin the straw a few times to loosen up the hole the pin has made.

Launching your pinwheel rocket Blow in the straw to inflate the balloon and then let go of the straw.

How It works:

The balloon-powered pinwheel spins because of the action-reaction principle described in Newton's Third Law of Motion. Stated simply, the law says every action is, accompanied by an opposite and equal reaction. In this case, the balloon produces an action by squeezing on the air inside causing it to rush out the straw. The air, traveling around the bend in the straw, imparts a reaction force at a right angle to the straw. The result is that the balloon and straw spins around the pin.

Assessment and Evaluation:

Evidence of Student Learning: design notes and drawings, accurate terminology, design model and oral presentation show understanding of key learnings, pinwheel performance.

