Objective
Harness the power of thrust forces to build a rocket pinwheel.

What You Need
Pencil
Pin
Balloon
Flexible Straw
Tape

To Do and Observe
1. Inflate your balloon to stretch it out a bit, and then release the air.
2. Slip the end on the balloon over the end of the straw furthest from the bend. Use tape to attach the balloon to the straw. 3. Make sure the seal is tight with no leaks by blowing through the straw to inflate the balloon. 4. Bend the end of the straw at a right angle. 5. Push the pin through the straw, about one inch from the balloon. 6. Push the pin (with the straw and balloon) into the eraser of the pencil. 7. Spin the straw around a few times. Blow through the straw to inflate the balloon, then let it go and watch your pinwheel spin!
3. Make sure the seal is tight with no leaks by blowing through the straw to inflate the balloon.

4. Bend the end of the straw at a right angle.

5. Push the pin through the straw, about one inch from the balloon.

6. Push the pin (with the straw and balloon) into the eraser of the pencil.

7. Spin the straw around a few times to loosen the hole in the straw.

8. Your rocket pinwheel is now finished! Blow through the straw to inflate the balloon, then let it go and watch your pinwheel spin!

What’s Going On
The balloon-powered pinwheel is an example of Newton’s Third Law of Motion, which states that for every action there is an equal and opposite reaction. If you’ve ever blown up a balloon and let it go you’ve experienced this law by watching the balloon fly around as the air comes out. Air has mass, it is made of molecules. The air molecules that are pushed out of the balloon push against the molecules in the atmosphere creating a reaction force called thrust that acts on the balloon. Thrust acts on the balloon with equal force, and in the opposite direction as the air that is squeezed out. Rockets are launched using the same principle: Rocket boosters are full of combustible fuel. Rocket fuel is mixed with an oxidizer in the combustion chamber and the gases quickly expand and rush out through the exhaust nozzle. This air creates thrust powerful enough to propel the rocket upward out of the earth’s atmosphere. In the case of our rocket pinwheel the balloon forces air out through the straw. Thrust causes the balloon to spin around in a circular motion.
Parent/Teacher Tips
What do you notice about the direction of the spinning straw and the direction of the air coming out of the straw? How does bending the straw affect the motion of the pinwheel? Would the motion change if the straw were straight? Try this by taking out the pin and straightening the straw, or by using a non-bending straw.

Cool Links http://www.allworldknowledge.com/newton/index.html