



## CREATE YOUR OWN WINDERIFFIC WINDMILL AND LEARN ABOUT THE THREE LAWS OF MOTION!

HARNESS  
THE **WIND'S**  
**POWER**

TO **CREATE**  
**ENERGY!**

Wind Turbines Need Wind to Work – A lesson in the Three Laws of Motion.

The three laws of motion:

- Inertia: an object will not move unless force is applied to it.
- $F=Ma$ : force equals mass times acceleration.
- Action/Reaction – for every action, or force, there's an equal and opposite reaction.

For a fun way to demonstrate the science watch Winderiffic. After watching Winderiffic you can construct your own wind turbines (in the form of a pinwheel) and demonstrate the Three Laws of Motion.

Pinwheels have pockets which catch the wind and harness its power to spin the blades, which makes it a small wind turbine. Making and using pinwheels is a great way to learn about the power of wind and the potential of wind energy. Use the Winderiffic! Pinwheel Activity found on [ULSafetySmart.com](http://ULSafetySmart.com)

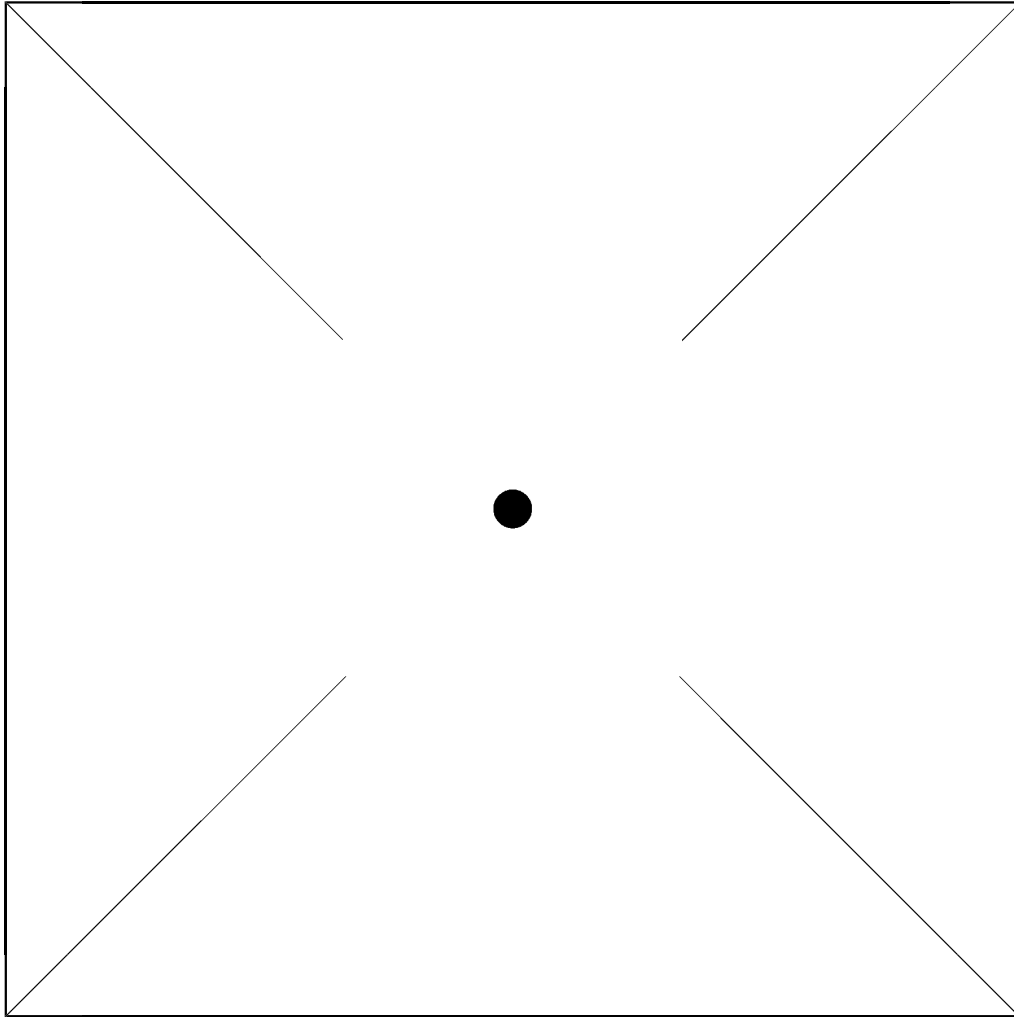
After constructing your pinwheel, experiment with each of the Three Laws of Motion.

- Inertia: hold the pinwheel at the base of the tower (pencil tip), balance it on the desk. Blow as hard as you can on the pinwheel. Notice that the blades are now spinning. The blades will not move unless a force (air) is applied to them. Now grab a friend and try this, one of you hold the pinwheel and the other blow on it. Whoever is holding the pinwheel gently touch the spinning blades. You have now proven that an object in motion will remain in motion at a constant speed until an outside force, like friction or drag, acts upon it, that's Inertia!
- $F=Ma$ : still holding the pinwheel at the base of the tower gently blow on the blades. Why do you think the blades don't move as quickly or at all when you blow gently vs. when they blow as hard as you can. It's the second law! More acceleration is needed to move larger blades. The larger the blades (mass) the more wind (force) is needed to accelerate it.
- Action/Reaction: think about the chair you are sitting in right now. Your body is exerting a force downward and the chair has to exert an equal force upward or the chair would collapse. Acting forces encounter other forces in the opposite direction. Now think about the blades of the pinwheel, when you apply a force (air) there has to be an equal and opposite reaction, the blades push back by spinning thus proving the third law!

## Winderiffic

### What you need

- Scissors
- Straight pin
- Pencil with eraser
- Colored pencils/pens/markers



### How to get started

- Cut out the pinwheel square shown above.
- On one side of the paper, write down each of the Three Laws of Motion (one per quadrant).
- In the last quadrant, create a fun slogan for the Three Laws of Motion and write it down.
- Following the lines on the template, cut in from all four corners, leaving about 2 inches of the center uncut.

### Construct pinwheel

- Gently bend (don't fold) one cut corner to the center point.
- Skip the next cut corner, and bend the third one.
- Skip and bend until four points meet in the center.
- Then stick the straight pin through all four points and the back of the pinwheel.
- Stick the pin into the pencil eraser.

