

# Balloon Helicopter

**Objective:** Use Newton's 3<sup>rd</sup> Law to explain the motion of a balloon helicopter.

**Materials:** Balloon Helicopter Kit, Balloon

**Procedure:**

1. Fill the balloon with air. (Do not attach the helicopter kit yet.) Hold the balloon with the stem pointing up and let it go. Describe what happens.
2. Draw a diagram of the balloon and the air in the balloon during the motion. Show the forces on the air and on the balloon. Describe the effect of these forces on the air and on the balloon.
3. Attach the helicopter kit to the balloon and inflate it. Hold the balloon with the stem (and helicopter kit) pointing up, and let it go. Describe what happens.
4. Examine the helicopter kit. Draw a diagram of the helicopter blades and the air from the balloon during the motion. Show the forces on the air and on the balloon. Hint: to explain the balloon's motion, you must show 2 forces on the helicopter blades. Don't forget about the air in the room. (You can ignore the part of the air that goes through the center whistle.)

5. Describe the effect of these forces on the air and on the blades. Use Newton's 3<sup>rd</sup> Law to explain the motion of a balloon helicopter.

6. A Harrier Jump Jet can use its jet engines to force air backward (like a normal jet) or down. Draw diagrams of the forces on a Jump Jet hovering over the ground and a Jump Jet accelerating forward. Be sure to describe what is exerting each force on the jet.