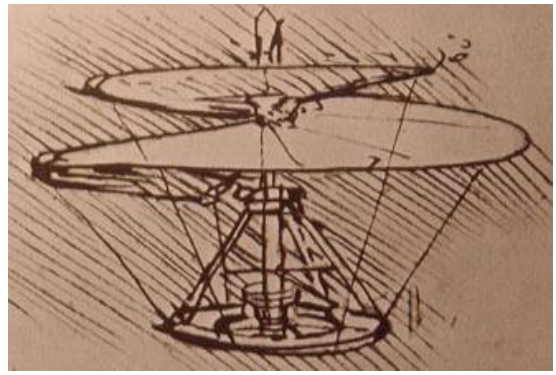
Do-It-Yourself Gyrocopter

Teacher Notes

Nearly 400 years before the invention of the helicopter, Leonardo da Vinci sketched out a machine designed to compress air in order to obtain flight.



When Igor Sikorsky designed the first successful helicopter in the late 1930's, da Vinci's spinning wing was his inspiration.

Today, you can easily build gyrocopters with your students to explore different designs and variables.

Materials:

- ✓ gyrocopter pattern printed on copy paper (see template on page 2)
- ✓ assorted papers (such as card stock, construction paper, tissue paper, etc.)
- ✓ scissors
- ✓ paper clips
- ✓ yardstick or tape measure
- ✓ stop watch or watch with second hand
- ✓ crayons or markers (optional)

How Does It Work?

Gravity causes the gyrocopter to fall.

The air resistance on the blades pushes them upward, and the compressed air under the blades (plus the drag on the blades themselves) causes them to spin and slows the gyrocopter's fall.

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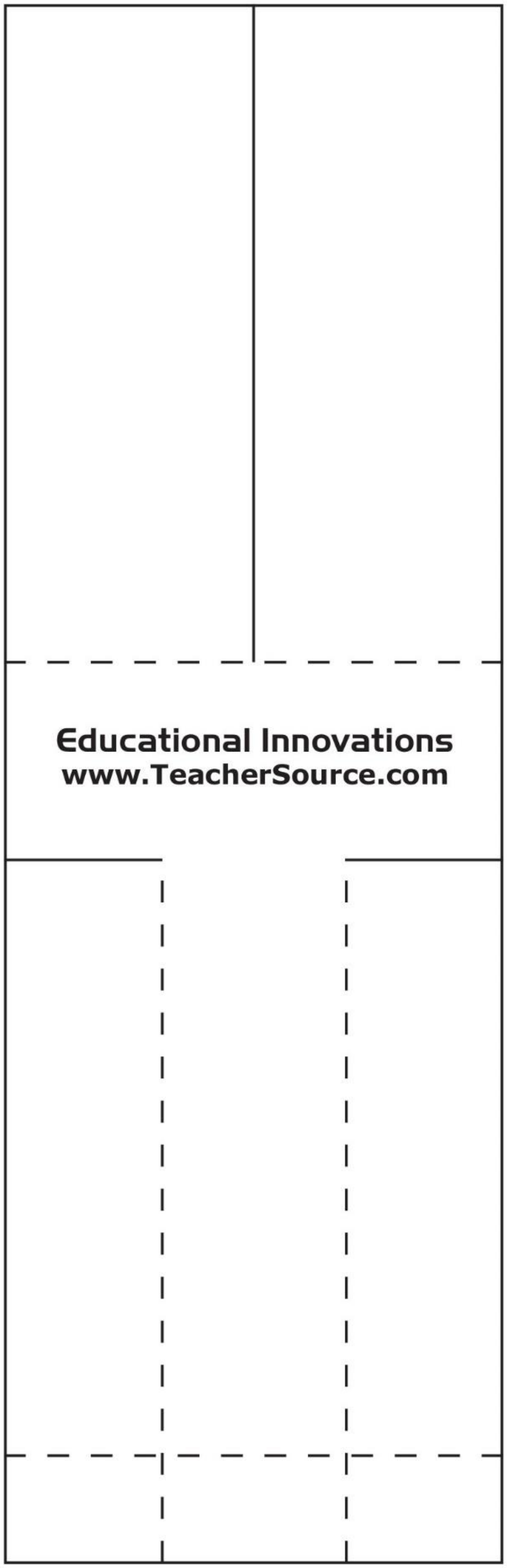

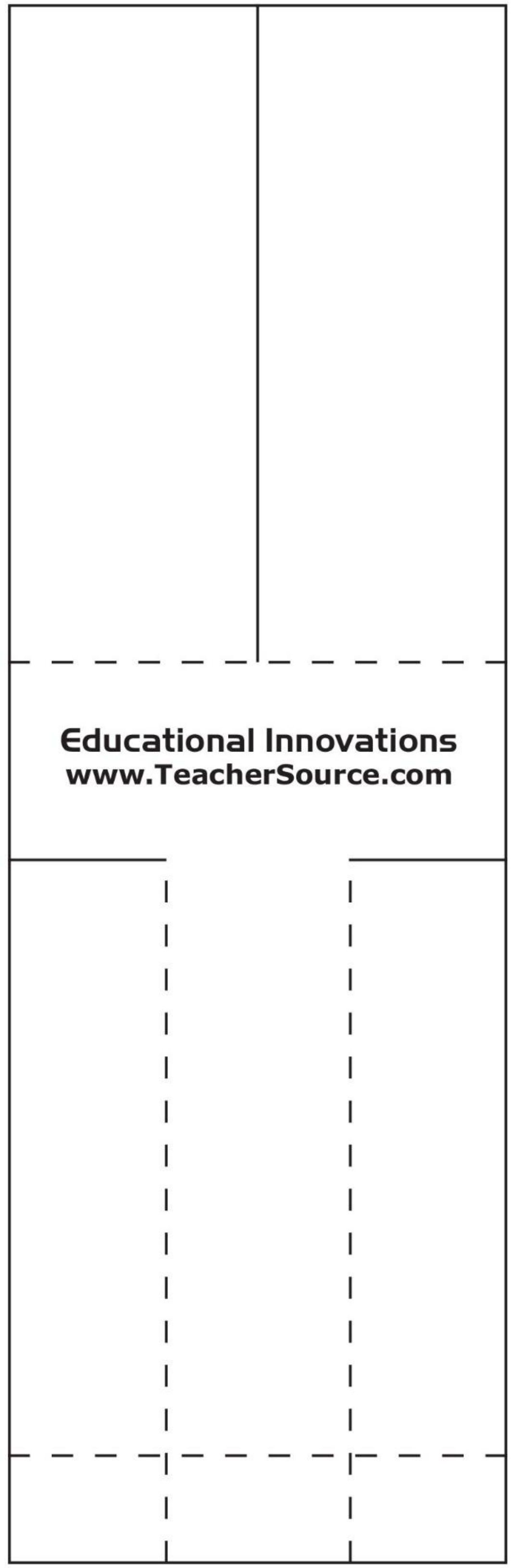

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Testable Question:

How long does it take for the gyrocopter to fall from a predetermined height?

Have your students construct a basic gyrocopter. Decide on a test height that would give accurate drop time results. Discuss conditions to avoid (such as testing outside or in windy conditions where you cannot control certain variables). In collecting their data, have your students conduct at least three separate drops using the same gyrocopter, keeping track of each fall time. Then average their fall times to use in the next step.

Possible Variables:

- ✓ type of paper used to build the gyrocopter (copy paper vs. card stock)
- ✓ angle of the blades
- ✓ holes in the blades vs. solid blades
- ✓ length or width of the blades
- ✓ shape of the blades
- ✓ weight added to the gyrocopter

After your students have answered that basic question, add these additional questions:

What can you do to alter the time it takes for your gyrocopter to fall?

How could you design your gyrocopter differently?

What is the relationship between each variable and the time it takes for the gyrocopter to reach the ground?

Which design gave you the longest fall time?

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Evaluation:

Have your students evaluate their design to determine which variables gave them the best results.

Extension:

These materials will help you take your air pressure lesson to the next level:

Balloon Helicopters (AIR-610)
These balloon powered helicopters are great for outdoor or indoor fun (if you have high ceilings). Simply snap the blades on the hub, place the balloon on the included collar, then inflate the balloon and you're ready for lift off! When you release, air travels through the blades, causing them to spin. We've gotten these to fly over 20 feet high.

SnapCopters (AIR-425)
Create what may be the world's smallest helicopter with the snap of your fingers. Illustrate the principles of flight including camber, lift, center of gravity, and momentum.

Hand Copters (AIR-430)
These colorful copters can be used for dozens of scientific investigations. Why won't the HandCopter work if launched clockwise? How does this simple 'toy' illustrate the Bernoulli Principle? Students can test different variables to determine what will make the HandCopter stay aloft longer or fly straighter. Illustrate the principles of gravity, force, and motion as well as the principles of flight including camber, lift, center of gravity, and momentum.

Aero Copters (AIR-222)
Catapult the Aero Copter into the sky with the rubber band launcher, and watch it fly! When the Aero Copter reaches maximum height, its blades open, and it spins back down to the ground, with the LED light illuminating its descent. Best flown at night.