

## THEORIES OF LIFT



## MAGIC BALLOONS AND AIRFOIL DESIGNS

Name \_\_\_\_\_

Class \_\_\_\_\_

*Your group will perform two experiments in which air flows around different surfaces and observe the results. Determine which theory or theories of lift best explain your observations in each experiment. Be prepared to share your ideas with the class.*

## EXPERIMENT 1: MAGIC BALLOONS

## MATERIALS (per team)

- 2 balloons
- Two (2) 12" pieces of string
- Tape
- Straw

## PROCEDURE

1. Inflate each balloon, and tie off the end.
2. Cut two pieces of string to the same length. About 12 inches long works well.
3. Tie one piece of string to the tied end of each balloon.
4. Using tape, attach the strings to a table or desk so that the balloons hang freely, one to two inches apart and about the same distance from the desk or table.
5. Use the straw to blow air between the balloons and observe what happens.
6. Vary the speed and amount of air and note any differences.





*Write your observations below.*

What happened when you blew air between the balloons?

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What changed when you varied the amount and speed of the air?

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Which theory or theories of lift best explain what you observed?

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Why did you choose this theory or theories?

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PROPRIETARY



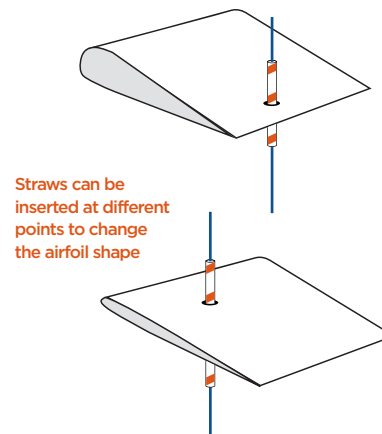
## EXPERIMENT 2: AIRFOIL DESIGNS

### MATERIALS (per team)

- Several pieces of 8-1/2" x 11" paper
- Tape
- Plastic straw (cut in thirds)
- String
- Scissors
- Single-hole punch
- Electric box fan or other small variable speed fan (per class)

### PROCEDURE

1. Cut your piece of paper to create two 5-1/2" x 8-1/2" sheets.
2. Bend the 5-1/2" x 8-1/2" paper in half as the illustration shows, being careful not to crease the fold.
3. Punch a hole through both sides of the paper. Where you place the hole will determine the shape of your airfoil. A hole closer to the fold will create a flatter shape, while a hole farther from the fold will create a more rounded shape.
4. Insert the straw through the hole, making sure it goes through both sides of the paper.
5. Insert the string through the straw, holding both ends, so the airfoil can move freely up and down the string.
6. Tape the ends opposite the fold together so your airfoil holds its shape.
7. With the fan off, position the airfoil in front of the fan with the fold in the paper closest to the fan.
8. Turn the fan on and watch to see if the airfoil rises. If it does, lift is being produced.
9. Try different fan speeds and different shapes of airfoils made by other students. Observe which airfoil shapes create the most lift.





*Write your observations below.*

What happened when you turned on the fan?

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What changed at higher speeds?

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Describe the airfoil shape that created the most lift?

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Which theory or theories of lift best explain what you observed?

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Why did you choose this theory or theories?

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PROPRIETARY