

Name:

Date:

Class:

### PAPER HELICOPTER LAB

#### Pre-Lab Questions:

1. What causes something to fall to the ground? \_\_\_\_\_

2. Who is Sir Isaac Newton? \_\_\_\_\_

3. What causes something to slow down as it is falling? \_\_\_\_\_

4. What is the name we give these two things? \_\_\_\_\_

5. What will happen to the three items, when I release them? Explain why. \_\_\_\_\_

\_\_\_\_\_

6. Which one will hit the ground first? \_\_\_\_\_ Why?

\_\_\_\_\_

7. Describe how it fell to the ground. \_\_\_\_\_

\_\_\_\_\_

8. Which item will hit the ground last? \_\_\_\_\_ Why?

\_\_\_\_\_

9. Describe how it fell to the ground. \_\_\_\_\_

\_\_\_\_\_

10. How do helicopters stay still in the air? \_\_\_\_\_

\_\_\_\_\_

11. What makes a good paper helicopter? \_\_\_\_\_

\_\_\_\_\_

12. Can you make different paper helicopters and decide which one is best? \_\_\_\_\_

\_\_\_\_\_

13. What do you mean by best? \_\_\_\_\_

\_\_\_\_\_

**Research:**

As you watch the film, Flight, write down 5 facts that either confirm what you already know about flight OR is new information that you learned as you watched the film.

- 1.
- 2.
- 3.
- 4.
- 5.

Did watching this film raise any questions for you? Is there something you want more information about?

- 1.
- 2.
- 3.

**Gravitational Field:** The space surrounding a massive body in which \_\_\_\_\_  
\_\_\_\_\_ body experiences a force of \_\_\_\_\_.

**Air Resistance:** The \_\_\_\_\_ that acts on something moving through \_\_\_\_\_.

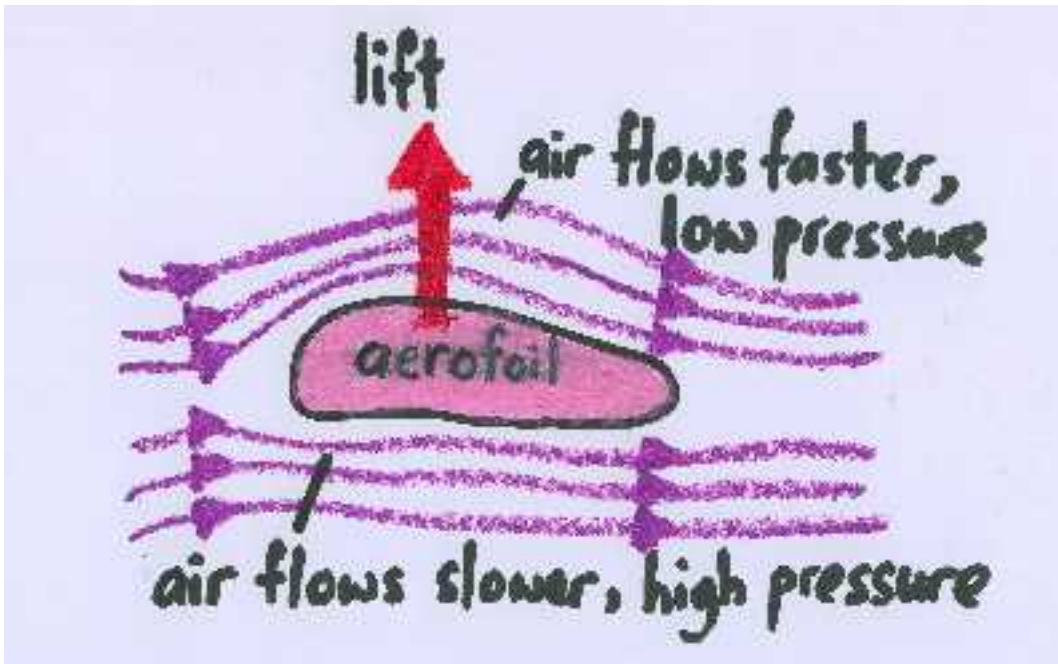
**Pressure:** The ratio of the amount of \_\_\_\_\_ to the area over which the  
force is \_\_\_\_\_.

**Velocity:** The specification of the \_\_\_\_\_ of an object and its direction of  
\_\_\_\_\_.

**Bernoulli's Principle:** Pressure of a fluid (air is a fluid) on a \_\_\_\_\_ decreases as the  
fluid's \_\_\_\_\_ relative to the surface \_\_\_\_\_.

**Archimedes' Principle  
for air:** Object surrounded by \_\_\_\_\_ is buoyed up by a \_\_\_\_\_  
equal to the \_\_\_\_\_ of the air displaced.

## Bernoulli's Principle:

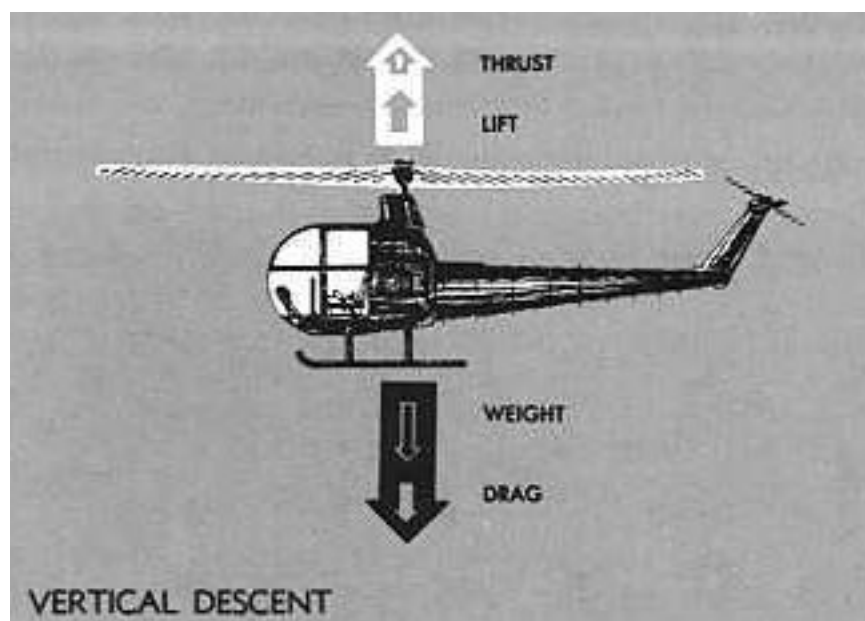


## Vertical flight:

During vertical flight in a no wind condition,  
Lift and thrust forces both act vertically upward.  
Weight and drag both act vertically downward.  
When lift and thrust equal weight and drag, the helicopter hovers.

When lift and thrust are **less than** weight and drag, the helicopter **DESCENDS** vertically.

When lift and thrust are greater than weight and drag, the helicopter rises vertically.



## The Effect of a Paper Helicopter's Blade Length on Hang Time

**Question:** How does a paper helicopter's \_\_\_\_\_ affect that same paper helicopter's \_\_\_\_\_?

**Hypothesis:** The \_\_\_\_\_ the paper helicopter's blade length, the \_\_\_\_\_ the paper helicopter will hang in the air (the longer hang time).

**Prediction:** If a paper helicopter's blade length is tested to determine the longest hang time, **then** the \_\_\_\_\_ the paper helicopter's blade length, the \_\_\_\_\_ the paper helicopter will hang in the air, **because** \_\_\_\_\_.

### List of Materials:

- 
- 
- 
- 
- 
- 

### Variables:

**Independent** (what will be changing): \_\_\_\_\_

**Dependent** (what will respond to the change): \_\_\_\_\_

**Constants** (what must remain the same): \_\_\_\_\_

**Experimental Setup:** (a labeled conceptual model of your experiment)

**Procedure:**

1. Prepare the \_\_\_\_\_ for flight. Cut on the solid lines and fold on the dotted lines.
2. Stand on a chair to \_\_\_\_\_ the paper helicopter from a height of \_\_\_\_\_.
3. Start the \_\_\_\_\_ when the paper helicopter is \_\_\_\_\_.
4. Stop the stopwatch when the paper helicopter hits the \_\_\_\_\_.
5. In the data table, record the number of \_\_\_\_\_ it takes for the paper helicopter to reach the ground. This is the paper helicopter's hang time.
6. Cut the ends of the blades at the Four.
7. Repeat steps two through five for the blade lengths of Four, Three, Two, and One.

**Data:**

The Effect of a Paper Helicopter's Blade Length on Hang Time

<b>Wing Length</b>	<b>Trial One</b>	<b>Trial Two</b>	<b>Trial Three</b>	<b>Mean of Trials</b>
<b>Five</b>				
<b>Four</b>				
<b>Three</b>				
<b>Two</b>				
<b>One</b>				

The Effect of a Paper Helicopter's Blade Length on Hang Time





