What in the “Whirl”?

It’s a Helicopter!

SCIENCE FAIR

Formal Report

By 4th Grade Classes

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**Topic:** Paper helicopters or Whirlybirds

We came up with this topic because it is fun and many students like helicopters. We also thought it would be fun and easy to do with little adult supervision.

**Background Research:** In order to fly, helicopters have to overcome gravity which pulls down on them. To do this, they have blades that lift the helicopter when they spin. Helicopters also need to overcome the wind slowing them down. Actual helicopters fly by generating an upward pushing force that occurs when the blades of a helicopter rotate, called lift. A difference in air pressure is created on both sides of the blades.  Under the blades the air pressure is high and above the blades the air pressure is lower.  This allows the helicopters to rise into the air.

For this project, we will build a miniature paper helicopter known as a whirlybird. The whirlybird is made of paper and it has a special shape that will make it act like a helicopter. The paper helicopters don’t generate lift or fly, but the force of air upward on the blades as they fall is what causes our paper helicopter blades to spin. As a paper helicopter falls, air presses on each of the blades with an equal force but in the opposite direction and the helicopter blades spin. The paperclips will add weight to the helicopter which can change how it spins.

Gravity is the force that attracts a body toward the center of the earth. The **weight** of an object is defined as the force of **gravity** on the object.

**Testable Question/Purpose:** Will adding paper clips (weight) make the helicopter go down faster?

**Hypothesis:** If you add paper clips to a paper helicopter, then it will go down faster.

**Materials:**

printer paper

stopwatch

3 paper clips

high place to drop whirlybird from

logbook

whirlybird helicopter template.

**Procedure:**

Download a whirlybird template

Print out the whirlybird template on a piece of printer paper

Follow the instructions on the template to cut out and fold the whirlybird.

Draw a table in your logbook so you can use it to record your data.

Drop the whirlybird from the same height at each trial and record the time it took to land.

Repeat the process with a paperclip added to the bottom after each trial as instructed in the table.

**Variables:** The variable is the number of paper clips on the whirlybird. These are listed in the log book table.

**Data:**

 TIME IN SECONDS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number of paper clips | Trial 1 | Trail 2 | Trail 3 | Average time |
| 0 | 5.35 | 4.99 | 4.86 | 5.07 |
| 1 | 4.88 | 4.29 | 4.13 | 4.43 |
| 2 | 4.08 | 3.60 | 3.47 | 3.72 |
| 3 | 3.50 | 3.35 | 3.25 | 3.37 |

**Results:** The whirlybird helicopter fell faster with the paper clips attached. It fell faster every time a paper clip was added. In each trail it also fell faster than the trial before it. We had to repeat trial 2 with one paperclip because it hit my sleeve when it went down. We started standing on the floor, but moved to standing on a chair to get more air time.

**Conclusions:** Our hypothesis was correct. The more weight or paper clips that were on the helicopter the faster it goes down. This is because the extra weight. Gravity pulls down and makes it go down faster when it is heavier.

**Recommendations:** The project would have been better if we could have dropped the whirlybird from a second-story window. It may have also been fun to keep doing the trials to see how low the time would go before it stopped working as a helicopter. A plastic helicopter would make it more consistent because the paper can bend too much.

**Bibliography**

Dunbar, Brian. “What Is a Helicopter?” *NASA*, NASA, 27 May 2015, www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-a-helicopter-58.html. Accessed 1 Jan. 2020.

Dziengel, Ana. “How To Make A Paper Helicopter.” *Babble Dabble Do*, 15 Nov. 2019, babbledabbledo.com/diy-toy-paper-helicopter/. Accessed 1 Jan. 2020.

Finio, Ben. “Make a ‘Whirly Bird’ from Paper: Science Project.” *Science Buddies*, Science Buddies, 28 July 2017, www.sciencebuddies.org/science-fair-projects/project-ideas/Aero\_p015/aerodynamics-hydrodynamics/make-a-whirly-bird-from-paper#summary. Accessed 13 Dec. 2019.