Name: _____ **Whirlybird Experiment** Date: _____
Partner: _____ Part 2 – Design a Whirlybird

The whirlybird is a fairly simple construction, but there are actually a number of factors that influence the time it takes to reach the ground. In a previous exercise, you focused on one of these (the number of paper clips attached to the base).

Look at your whirlybird and try to think of other factors you could change. These factors could become the variables in other experiments to determine the flight time of a whirlybird. Discuss these with other students in the class.

List several factors that you think will affect the flight time of the whirlybird:
(we will take this up in class – add any factors that you might have missed)

Working in groups of two, students will explore **a single factor** using the same experimental approach from the previous experiment (with multiple paper clips). It is important that each factor, or variable, can be measured and represented as a definite value (e.g., the number of paper clips).

When performing an experiment of this type, it is important to focus only a single variable. Scientific experiments are performed to help us to test a hypothesis, and hopefully draw some useful conclusion. By restricting our investigation to one variable, we minimize the chances of other factors confusing or corrupting our experiment.

Group Members: _____ _____

Variable Tested: _____

Consider the data presented for all of the groups. It provides you with information on how a number of factors affect the flight time of the whirlybird. Summarize the results

Variable	Effect on Whirlybird Flight Time

Using the data obtained by the class, and your own observations, it is your task to create the best whirlybird possible (i.e., with the longest flight time).

You must also submit the second lab report with your whirlybird.

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Question: (What we hope to answer by performing the experiment)

Hypothesis: (A guess that answers your question. You could also provide a reason why you guessed this.)

Materials: (A list of the materials or items required for this experiment)

- whirlybird cutout template on regular paper
- a single standard paper clips
- a stopwatch or other time recording device

Procedure: (A list of instructions that tell you, or anybody else, how to perform your experiment)

1. Carefully cut out the whirlybird shape from the paper template.
2. Along the dotted line, fold one wing forward and the other wing back.
3. Attach a paper clip to the bottom.
4. Hold your whirlybird at the maximum height you can reproduce consistently and drop it.
5. Measure the time required for the whirlybird to hit the floor and record it on your data sheet.
6. Repeat steps 4 and 5 two more times and record the data each time.
7. Modify a single factor/variable on your whirlybird and repeat steps 4, 5, and 6.

Observations: (A record of what you saw and measured during the experiment)

Modification	Flight Time (seconds)			Average Flight Time $t_{avg}=\frac{t_1+t_2+t_3}{3}$
	Trial			
	1	2	3	

Discussion: (Your thoughts on the experiment – what you observed, what went wrong, etc.)

1. Independent Variable: (What I'm changing, or controlling, in the experiment)

2. Dependent Variable: (What I'm measuring)

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3. Controlled Variables: (What stays the same each time I perform the experiment)

4. Graph: (A visual representation of our experimental data)

   When graphing experimental data, we put the *independent data* on the horizontal axis, and the *dependent* data on the vertical axis.

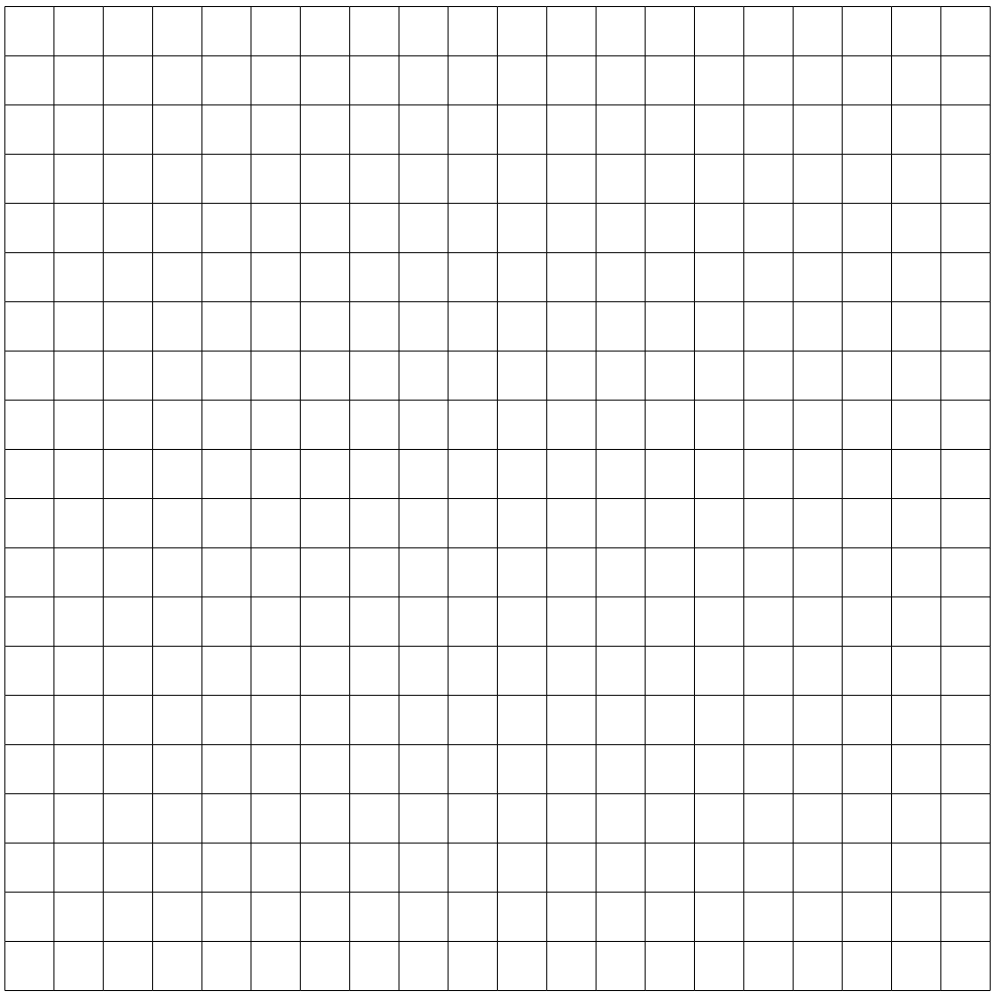
   Graphs should always include a title, and each of the axes should be labelled with a description and the units (if it has units).

Title: _____

Label Vertical Axis
(units in brackets):

_____

_____



Label Horizontal Axis (units in brackets): _____

Conclusion: (The answer to your question, based on experimental data. Was your hypothesis correct?)