



AEROLAB

VARIABLES

Name _____

Class Period _____

Background: When conducting experiments, one needs to deal with *variables*, those factors or elements that are likely to vary or change. A typical study has an *independent variable* and a *dependent variable*.

The independent (or manipulated) variable is something that the experimenter purposely changes or varies over the course of the investigation. For example, s/he might change the position of the wing to see how it affects the average speed of a model plane.

The dependent (or responding) variable is the one that is observed and likely changes in response to the independent variable. In the example above, the average speed of the plane is the dependent variable because it is expected to change as a result of moving the position of the wing.

When conducting an experiment, all other variables must be kept the same throughout the investigation; they should be *controlled*. The variables that are not changed are called *controlled variables*.

Directions: You will be designing an experiment to see what affects the average speed of a *JETSTREAM*. Work with your partners and answer the questions below:

1) What factors may increase or decrease the average speed of your *JETSTREAM*? List a few ideas:

2) We plan to investigate/change the following variable:

3) We plan to keep the following variables the same throughout our investigation:

4) Calculate the distance your plane will fly around the pylon:

The radius from the pylon to the fuselage = _____ meters

One revolution = Circumference = $2\pi r$ = _____ meters

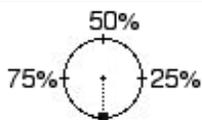




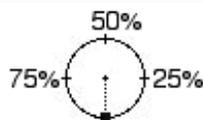
5) After winding your plane 1000 times, release it and note the exact point of takeoff. Record the takeoff point on each circle below. (The release point of the plane is represented by the dot at the bottom of the circle.) Meanwhile, have another person in your group time how many seconds the plane flies in the air around the pylon while a third person counts the laps in the air. Stop timing and counting laps the instant the wheels of the plane touch down. Wind the rubber motor of the plane the same number of times for each trial.

6) Record your data in the table below:

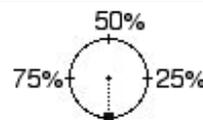
LAPS AND FLIGHT TIME OF THE JETSTREAM			
Trial 1	Trial 2	Trial 3	Averages
Laps =	Laps =	Laps =	Average Laps =
Seconds =	Seconds =	Seconds =	Average Seconds =



Takeoff = ___ %



Takeoff = ___ %



Takeoff = ___ %

7) Calculate the average speed of your JETSTREAM.

$$\text{Average Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{(\text{Average Laps} \times \text{Circumference})}{\text{Average Seconds}} = \text{_____ m/sec}$$

8) We investigated/changed the following variable:

9) What was the result?

10) Was the average speed of this experiment different from your initial unmodified flights? Why or why not?

