

Relationship between the Volume of a Balloon and Efficiency of Output



Mode of Energy

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Physics 124 Presentation

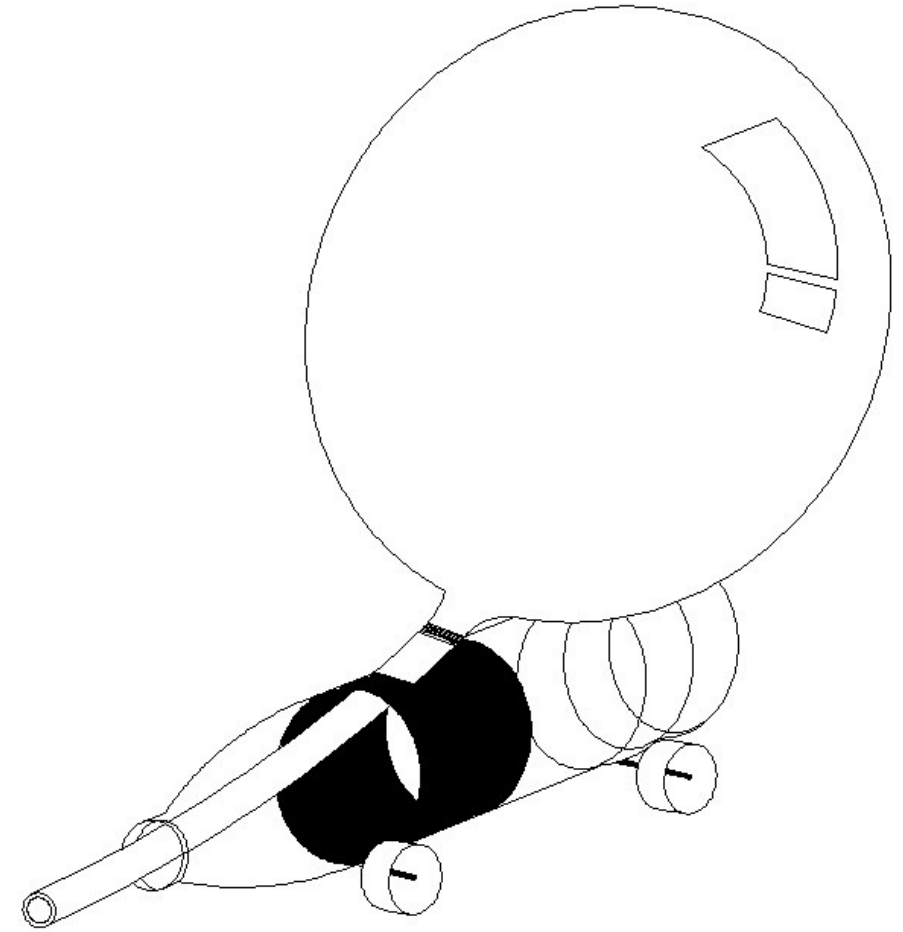
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Predicted Outcome

Outline of Presentation

- Significance of Experiment
- Theoretical Background
- Method Used
- Calculations Involved
- Conclusions Derived
- References

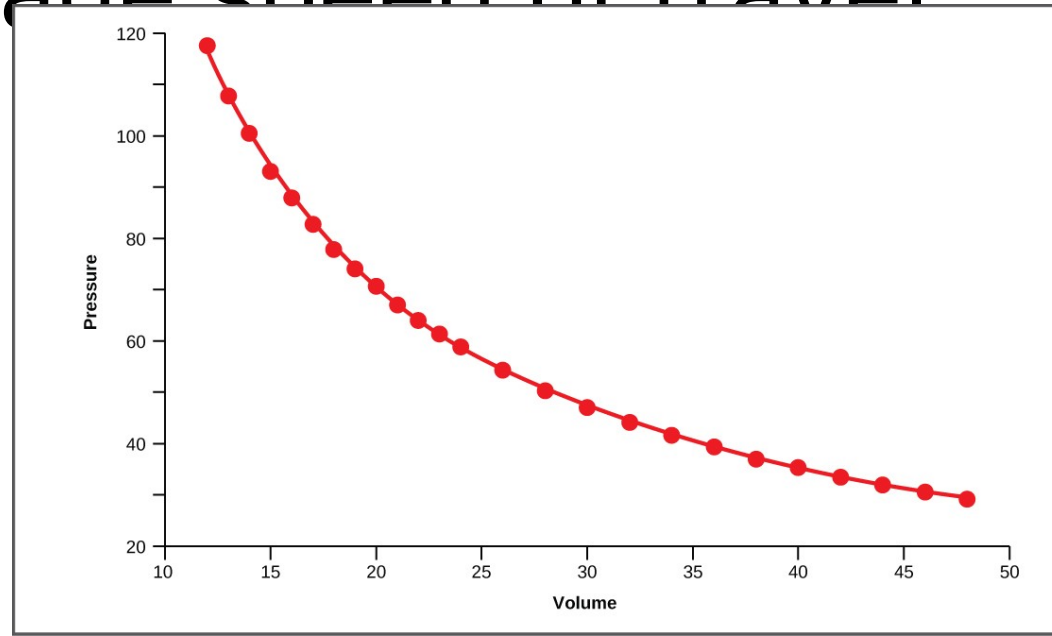


Significance:

- The experiment was chosen for the purpose of studying the relationship between Mechanics and Volume of gas supplied.
- The experiment helped us discover this relationship, as well as observe the uncertainties in the experiment along with the predicted outcomes.
- Since Pressure and Volume have an inverse proportionality, we can say the same about it and supplied Energy.

Theoretical Background:

From basic predictions, it can be assumed that the bigger the volume of balloon, the higher the distance will be travelled, as well as the average speed of travel



Materials Involved

- 1 Birthday Balloon
- Cardboard-made equally shaped wheels
- 3 Straws
- Tape
- Rubber Band

Methods Used

- The bottle had various holes punctured in it, for placing axles of the wheels and for placing the balloon as a fuel source.
- The balloon was attached using the rubber band and string to ensure that it sticks to the straw.
- The wheels were attached to the straws for mobility of the bottle.
- Air was supplied estimating the radius of the balloon using a measuring tape. Distance travelled was measured using a meter rule.



Calculations Involved:

- For measurements, we used the formula involving Power.

$$E_k = \frac{1}{2}mv^2$$

E_k = kinetic energy of object

m = mass of object

v = speed of object

$$P = \frac{W}{\Delta t}$$

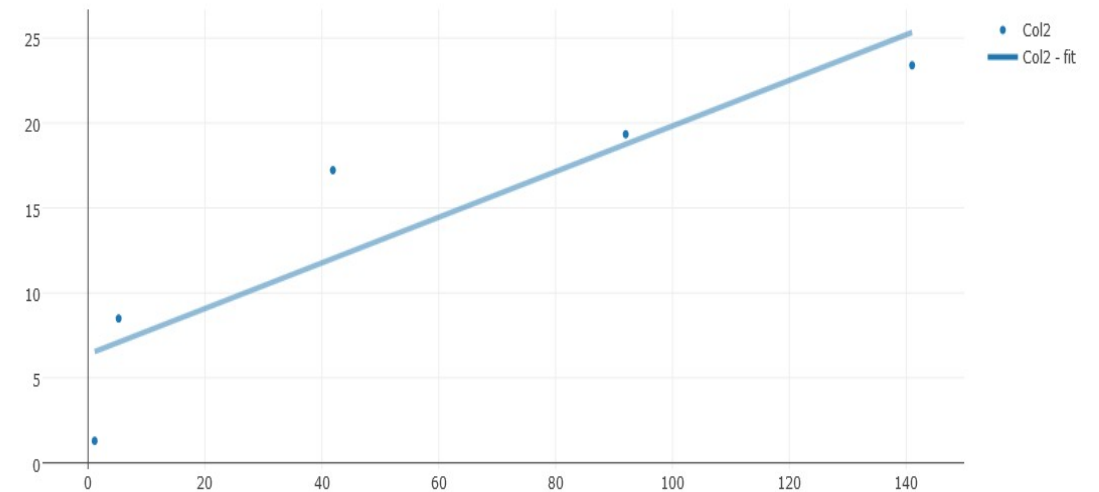
- The aforementioned formula used the mass of the body, which was approximately 22g, and the average velocity.
- Time was calculated supposing the distance as a constant of 1 meter.

The Measurements

The experiment consists of the following inputs:

Balloon Radius (cm)	Time Taken (s)	Volume (m ³)	Power Output (W)
3	13.45	1.13×10^{-4}	1.30
5	9.32	5.24×10^{-4}	8.50
10	4.72	4.19×10^{-3}	17.23
13	4.16	9.20×10^{-3}	19.34
15	3.83	14.1×10^{-3}	23.40

The following graph is Volume versus Power



Conclusions Derived

- The results indicate in favor of the theoretical predictions of this experiment.
- With the measurements, we were able to construct a graph relating the two different properties of Volume and Power.



References:

- http://www.sciencebuddies.org/science-fair-projects/project_ideas.shtml
- Giancoli, Douglas C. *Physics for Scientists & Engineers with Modern Physics.* , 2008. Print.