

Data Analysis Exercises: Boyles Law

INTRODUCTION

In 1662 Robert Boyle conducted an experiment that determined the relationship between Pressure and Volume. The temperature of a certain quantity of gas was held constant. The gas was put under increased pressure and then the volume was recorded at various intervals. The data could then be graphed and see what type of relationship is present.

OBJECTIVE

The objective of this project is to verify that Boyle's findings are correct. Are pressure and volume inversely related? Does his data prove "Boyle's Law".

DATA

TABLE 1: Actual Data from Boyle's Law experiment

volume (V)	pressure (P)	volume (1/V)
48	29.125	0.020833333
46	30.5625	0.02173913
44	31.9375	0.022727273
42	33.5	0.023809524
40	35.3125	0.025
38	37	0.026315789
36	39.3125	0.027777778
34	41.625	0.029411765
32	44.1875	0.03125
30	47.0625	0.033333333
28	50.3125	0.035714286
26	54.3125	0.038461538
24	58.8125	0.041666667
23	61.3125	0.043478261
22	64.0625	0.045454545
21	67.0625	0.047619048
20	70.6875	0.05
19	74.125	0.052631579
18	77.875	0.055555556
17	82.75	0.058823529
16	87.875	0.0625
15	93.0625	0.066666667
14	100.4375	0.071428571
13	107.8125	0.076923077
12	117.5625	0.083333333

GRAPH OF DATA USING EXCEL

CHART 1: Pressure vs Volume

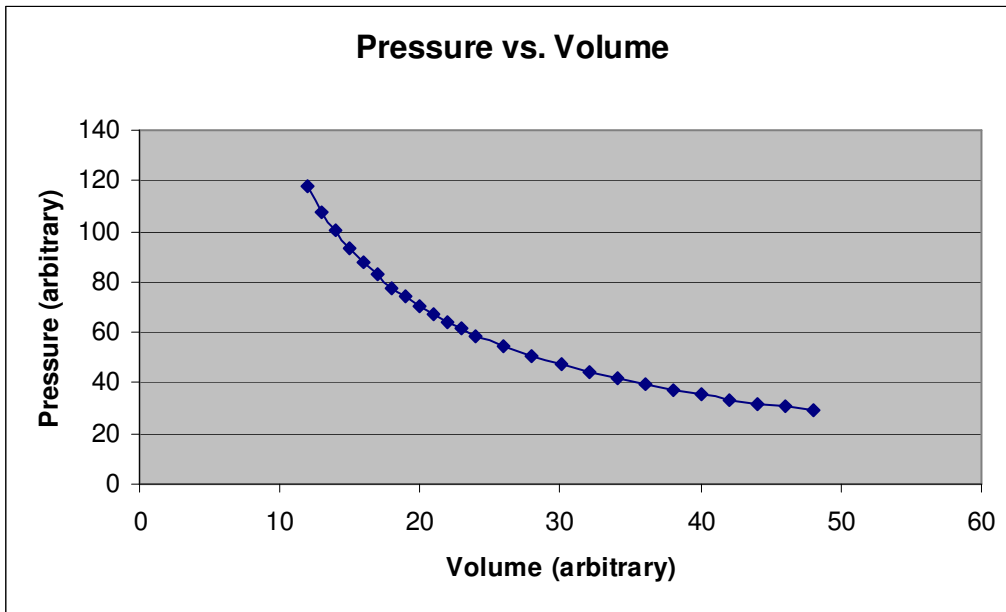
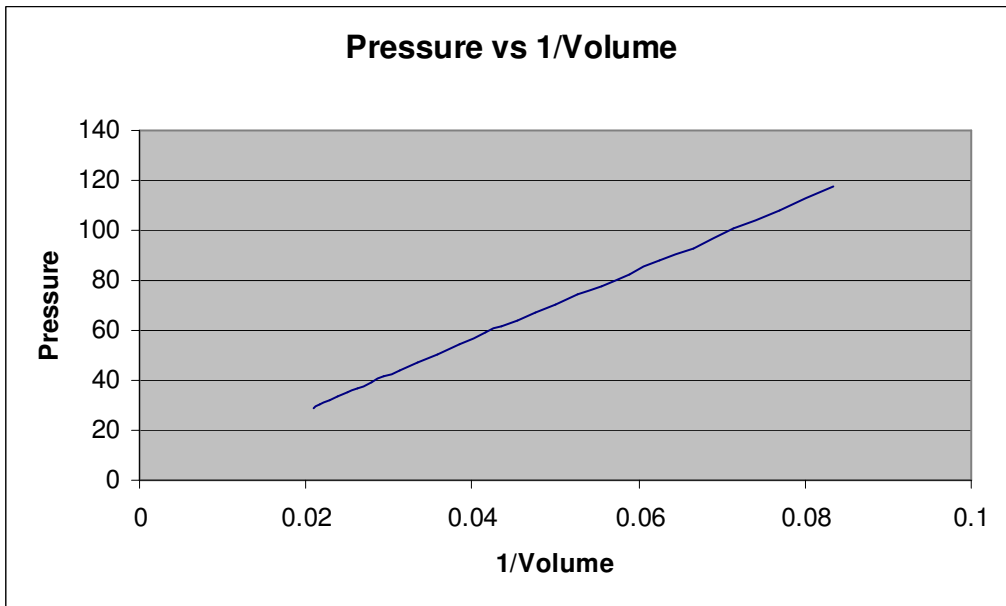


CHART 2: Pressure vs 1/Volume



ANALYSIS OF RESULTS

Table 1 indicates Boyle's actual values for Pressure and Volume. When Pressure and Volume are graphed, an inverse relationship is seen. As Volume increases, the Pressure

decreases. To further see this relationship, Pressure can be graphed with $1/\text{Volume}$. A straight line is seen and Boyle's law of Pressure and Volume being directly related is proven using his own data.

CONCLUSIONS

Boyle's law states that as you increase the Pressure of a system of gas, the volume of that system of gas decreases. To prove that point, the data from his 1662 experiment was graphed and an inverse relationship was discovered. Furthermore, when pressure versus $1/\text{volume}$ is graphed a straight line proves that Robert Boyle's law is correct.