Question: What is the effect of pressure on the volume of a gas?

Claim: If the pressure on a gas is increased, then its volume will decrease because the gas molecules will be pushed together. Furthermore, the relationship between pressure, P, and volume, V, should be an inverse proportion, in which PV is constant and $P = kV^{-1}$ for some constant, k

Evidence:

Circular Top of the Syringe

Diameter (cm)	**Radius,** r (cm)	**Area,** πr^2 (cm^2)
3.60	1.80	10.2

Trials	**Mass on Syringe** (kg)	**Pressure,** P $(\frac{kg}{cm^2})$	**Volume,** V (mL)	PV
No Book or Weight	0	1.03	50.0	51.5
Book Only	0.498	1.08	47.5	51.3
Book + 1kg of weight	1.498	1.18	43.5	51.3
Book + 2kg of weight	2.498	1.27	40.5	51.4
Book + 3kg of weight	3.498	1.37	37.5	51.4
Book + 4kg of weight	4.498	1.47	35.0	51.5

If PV remains constant over several trials of different pressures and volumes (controlling for amount of gas, type of gas, temperature, etc. of course) within a margin of mathematical error, $P = kV^{-1}$ where k is a constant (P and V are inversely proportional). The experimental results confirmed that pressure and volume are inversely related, reaffirming Boyle's Law (pressure and volume are inversely proportional). The power regression confirmed this.

Justification (Reasoning) of the Evidence:

As partially explored in the claim, increased pressure pushes gas molecules together—decreasing volume. This experiment measures those two features well because the book and extra weights placed on top of the syringe's plunger confer an equally distributed force to the part of the plunger inside the syringe, forcing the air to "push back" harder than if there were no weight at all in order to maintain equilibrium. The only other property of the air in the syringe which can change is volume (which is unconstrained by any other variable than pressure), so equilibrium is always maintained by the volume changing in proportion with Boyle's Law.