Combined gas law

Recall that in Boyle's law, T is kept constant:

$$T = const$$
 $p \cdot V = const$

In Gay-Lussac's law, V is kept constant:

$$V = const$$
 \longrightarrow $\frac{p}{T} = const$

In combined gas law, we can change p, V, and T:



Homework 25

Problem 1.

Using the combined gas law, derive Charles's law: how the volume and temperature of the gas change when the pressure is kept fixed?

Problem 2.

The temperature of a gas is increased 2 times (measured in Kelvin), and its volume is decreased 3 times. How does the pressure change?

Problem 3.

We have a vertical cylinder with a piston of area A. The cylinder is filled with gas, which occupies volume V under the piston. The piston has mass m and can move without friction. What will happen to the gas volume if we move the cylinder upwards with acceleration a? Assume that you know the atmospheric pressure p_0 and that the gas temperature is kept constant.