

>> In 6.5 liters of gas has a pressure of 1.7 atmospheres what will the pressure be if the volume increases to 13.0 liters? Okay here what we want to do is we want to identify our numbers that we're going to be working with. We're given 6.5 liters of a gas, liters is volume. So, let's go ahead and call that volume 1. And we know that 6.5 liters of a volume of gas has a pressure of 1.7 atmosphere. So, let's call that pressure 1 since both of those go together. Now what will the pressure be? Okay that's our question. So, there's going to be a second pressure we're talking about here. This is going to be pressure 2. And we already know it's going to be a question. What will the pressure be if the volume increases to 13.0 liters? That's going to be our volume 2. So, what we're looking at now is a problem that gives us 2 volumes, 1 pressure and we're asked what is the other pressure. So, we can write this down, we said we've got pressure number 1 is 1.7 atmospheres. Volume number 1 is 6.5-liters. Pressure number 2 we don't know. Volume number 2 is 13.0-liters. Well what do we know, what equation do we have that relates 2 pressures and 2 volumes together? That would be Boyle's law. Boyle's law tells us that pressure 1, volume 1 equals pressure 2 times volume 2. Okay. So, we can go ahead and use Boyle's law. But what we want to do now since we're solving for pressure 2 we have to rearrange this equation to isolate pressure 2. We want to get rid of the volume 2 on this side of the equation and so what we've done here is we've divided both sides equation by volume 2. By doing this we cancel out volume 2 on this side and we have our new equation pressure 2 equals P1 times V1 over V2 and I have it written here.  $P_2 \text{ equals } P_1 \text{ times } V_1 \text{ over } V_2$ . Now we've got something we can work with. We can go back now and either from here or from here we can put our numbers in for P1, V1 and V2 from our data. It's really important that you do this carefully because it's very easy to flip these 2 numbers and accidentally put the numbers in the wrong place. Okay. We have pressure 2 equals 1.7 atmosphere times 6.5-liters divided by 13.0-liters. These liters now are going to cancel leaving us with atmosphere and we end up with pressure 2 equals 0.85 atmosphere. We have to ask ourself at this point does that make sense? We started with a higher atmosphere of pressure ended up with a lower pressure. Okay. Well what did we start with? We started with a 6.5-liters for volume and the volume increased. Now we know pressure and volume behave inversely. So, when volume goes up pressure has to go down. Volume went up, therefore pressure had to go down and that's exactly what we saw here.