Gas Law Practice

Name: _____

Show ALL work and CIRCLE final answer!

What is Boyle's Law? (equation)

What is Charles's Law? (equation) **Remember, when using Charles's law… then temp has to be in Kelvin**

What is Pascal's Principle? (equation)

What variable stays constant in Boyle's Law? Charles's Law? Pascal's Principle?
(Be specific in your answer)

1. A small balloon with a volume of 0.5 L and at a temperature of 40˚C is warmed to 60 ˚C. What is the final volume of the balloon?

2. An engine shop uses a lift to raise a 1784 N engine. The lift has a large piston with an area of 76.32 cm2. To raise the lift, force is exerted on a small piston with an area of 12.56 cm2. What force must be exerted to raise the lift?

3. A small helium tank claims to be able to fill 30 balloons to a volume of 3.15 L at a pressure of 101 kPa. How many liters of helium will the tank be able to produce at a pressure of 94.2 kPa?

4. A bicycle pump uses Pascal's law to operate. The air in the hose acts as a fluid and transfers force and pressure from the piston to the tire. If a pump has a piston with an area of 7.1 cm2, how much force must be exerted on it to create a pressure of 8.2×10^5 Pa?

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5. A student in the lunchroom blows into his straw with a force of 0.26 N. The column of air pushing the liquid in the glass has an area of 0.21 cm2. If the liquid in the glass pushes upward with a force of 79 N, what is the area of the liquid at the surface of the glass?

6. An oxygen tank holds 355 L of oxygen at 8230 kPa. What volume would the same amount of oxygen take up if the pressure were reduced to 4.11×10^3 kPa?

7. An inflated rubber glove has an initial volume of 104 mL. What is the final volume if the gloved is warmed from 300K to 340K?

8. At a sewage treatment plant, methane is gathered for energy use. If 75 L of methane is produced at 94 kPa, how many liters would be produced at 100 kPa? Assume temperature remains constant throughout.

9. A science class puts a balloon containing 1.25 L of air at 101 kPa into a bell jar. Using an air pump, the class removes some of the air in the jar, causing the balloon to expand to a volume of 2.25 L. What is the new pressure inside the jar?

10. A balloon increases in size from 1034 mL to 1.4L during a 45 ˚C temperature change. What is the final volume of the balloon if it started at 2.5 ˚C?

11. A factory lift is used to raise a load of 2225 N on a piston that has an area of 706.8 cm2. How much pressure does the lift's engine need to exert on the hydraulic fluid to lift the required load?

12. A balloon with is cooled from 98 ˚C to 78 ˚C. If the initial volume is 607 mL, what is the final volume of the balloon (in mL and L)?

13. A plastic food storage bag is sealed with 0.213 L of air inside at a pressure of 99.2 kPa. The bag is loaded onto a plane, where the pressure is decreased to 80.5 kPa. What is the size of the air in the bag after the pressure is decreased?

14. A balloon is cooled from 333K. What is the temperature of the balloon if the volume decreased from 567 mL to 0.334 mL?