G8 Science: Class 13 Homework

1. Fill in the blanks: **[7 marks]**

    a) According to Boyle's Law, as volume increases, pressure _____, and as volume decreases, pressure _____.

    b) According to _____, as volume increases, temperature increases. And as volume _____, temperature decreases.

    c) According to _____, as pressure _____, temperature increases and as pressure _____, temperature decreases.

2. What is the role of valves in the human circulatory system? What condition results when the veins fail to close? **[2 marks]**

3. What is one advantage of using pneumatic power over hydraulic power and how is it applied to everyday life? **[2 marks]**

4. Compare and contrast atmospheric pressure and water pressure. **[3 marks]**

5. You have created a lift system using syringes. You would like the system to respond immediately and precisely. Should this be a hydraulic system or a pneumatic system? Explain. **[3 marks]**

6. The figure below shows a simple pneumatic system.

   a) If you wanted to use this system to increase force, should the effort be applied to piston A or piston B? Explain. **[2 marks]**

   b) What advantage would you gain if you applied the force to the other piston? Explain your answer. **[2 marks]**

7. Cars use a hydraulic braking system. If the system used air instead of hydraulic brake fluid, how different might pushing on the brake pedal feel? Explain. **[2 marks]**

8. A window washer notices that the spray hoses he uses are spraying water at too high pressure and damaging the trim on the windows. How could he adjust the nozzle to reduce the flow of the water? **[2 marks]**

9. When we suck on a straw in a juice pack, the sides of the container collapse. How does the pressure inside the juice pack and the atmospheric pressure compare? What causes the collapse? **[3 marks]**

10. How is atmospheric pressure affected by altitude and why? **[2 marks]**

11. A hydraulic lift office chair has its seat attached to a piston with an area of 11.2 cm^2. The chair is raised by exerting force on another piston, with an area of 4.12 cm^2. If a person sitting on the chair exerts a downward force of 219 N, what force needs to be exerted on the small piston to lift the seat? Use the GRASS method. **[5 marks]**

12. In a newly designed car with a hydraulic braking system, a force of 85 N is applied to one of the master cylinders, which has an area of 8.1 cm^2. The master cylinder is connected to one brake piston, which exerts a force of 296 N. What is the **area** of the brake piston? Use the GRASS method. **[5 marks]**

13. A full juice can has a hole at the top and another hole at the bottom. How will the juice flow out of the two holes and justify your answer. **[4 marks]**

14. Using the information you learned in this unit, state whether air would flow into or out of a low-pressure system. **[2 marks]**

15. A hydraulic system has a greater output force than an input force. How does the area of the output piston compare to the area of the input piston? **[2 marks]**

16. Suppose the door of an airplane flying at a high altitude suddenly opened. Would air move into or out of the airplane? Explain. **[2 marks]**

17. Explain why a spill of a fluid with a density greater than water might cause more damage than the spill of a fluid that is less dense than water. **[2 marks]**