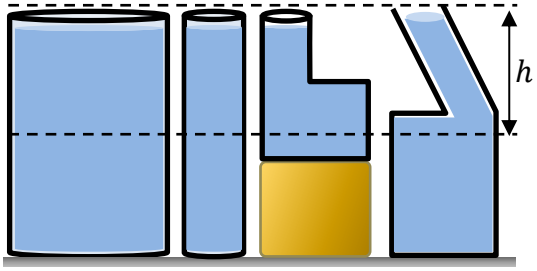
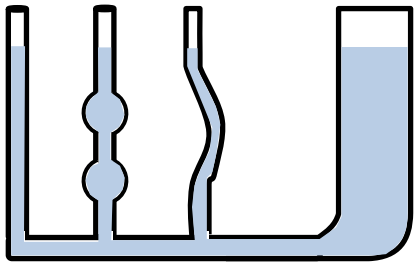
PASCAL'S LAW AND THE HYDRAULIC LIFT

● **(1)** PASCAL'S LAW**: "**Pressure in a confined fluid is transmitted equally throughout the fluid**".** ALSO**:**

(2) Pressure in a liquid DOES / DOES NOT depend on the shape of the container**.**

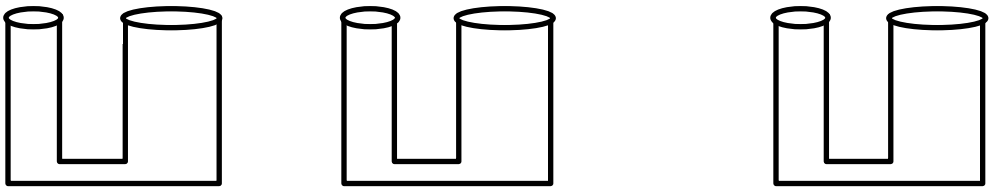
(3) In connected columns, liquid HEIGHT is the same if _____ is the same **("**water seeks its own level**")**





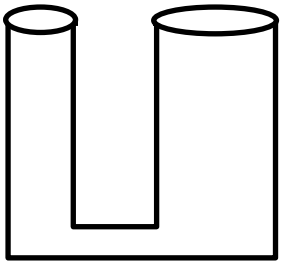
● HYDRAULIC LIFT**:** Pressure within the SAME liquid is equal at the SAME _____**.**

(1) No pistons (caps) **(2)** Pistons of same thickness **(3)** Push down on left piston



EXAMPLE**:** A hydraulic lift is designed with columns having areas 1 m² and 4 m²**.** Pistons of equal thickness are placed on top of each column of water**.** If you push down with 10 N on the smaller column, causing it to lower by 20 cm**:**

(a) How much force acts on the right piston**?** **(b)** How much does the right piston rise by**?**



● Hydraulic Lifts MULTIPLY _____ by a factor of _____**.** This factor is called Mechanical Advantage**.**

- Hydraulic Lifts also REDUCE _____ by the same factor**.**

- MOST Hydraulic Lift problems have cylindrical columns **(**Area = _____, Volume = _____ = _____**)**

EXAMPLE: HYDRAULICT LIFT / PROPORTIONAL REASONING

EXAMPLE**:** A hydraulic lift is designed with cylindrical columns, one having double the radius as the other. Both columns are capped with pistons of the same density and thickness**:**

(i) If you push on the piston on the thinner column with force F, how much force will act on the other piston**?**

(a) F/4 **(b)** F/2 **(c)** F **(d)** 2F **(e)** 4F

(ii) If you cause the piston on the thinner column to move a distance H, how much will the other piston move**?**

(a) H/4 **(b)** H/2 **(c)** H **(d)** 2H **(e)** 4H

EXAMPLE: HYDRAULIC LIFT / FORCE TO LIFT CAR

EXAMPLE**:** A hydraulic lift is designed with cylindrical columns having radii 20 cm and 2.0 m. What minimum downward force is needed on the smaller piston to lift an 800-kg car on the larger piston**?**