

Planet Holloway **websheet 9.1**

AP Physics 2 - Chapter 9 Fluids

You may print this out and write on it or work on your own paper.

Show all work.

1. A 1250 kg car on a hydraulic lift rests on a cylinder with a piston of radius 0.35 m. If a connecting cylinder with a piston of 0.025 m radius is driven by compressed air, what force must be applied to the smaller piston in order to lift the car?
2. A column of mercury in a barometer stands at 70 cm, what is the atmospheric pressure? (The density of mercury is $13.6 \times 10^3 \text{ kg/m}^3$).
3. A block of wood (density 0.48 g/cm^3 and mass of 800 g) floats in a container of oil (density 0.75 g/cm^3). What volume of oil does the wood displace?
4. A ping-pong ball has an average density of 0.07 g/cm^3 and a diameter of 3.85 cm. What force is required to keep the ball completely submerged in oil (density 0.75 g/cm^3)?
5. A rock is measured by a spring scale to have a mass of 9.5 kg in air and a mass of 3.9 kg when submerged in water. What is the density of the rock?
6. An ideal fluid flows through a pipe with two sections of different radii. If the first section has a radius of 2 cm and the second section has a radius of 5 cm, what is the ratio of speed in the first section to the second section?

Answers:

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| 1. 63.78 N | 4. 0.203 N |
| 2. $0.952 \times 10^5 \text{ N/m}^2$ or Pa | 5. 1696.43 kg/m^3 |
| 3. 0.0011 m^3 | 6. 6.25 (no units because it's a ratio) |