

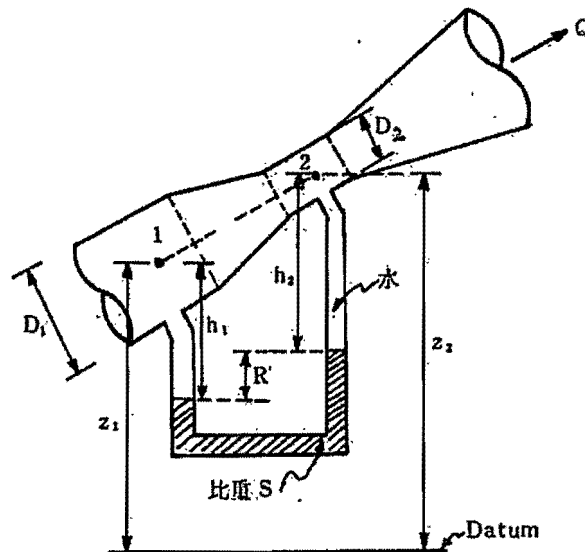


(禁止使用計算機，不易計算出答案之部分，請詳列計算式或過程)

1. If a uniform solid body 50 N in air and 30 N in water, what is its specific gravity? (10%)
2. What is the only possible dimensionless group that combines velocity  $V$ , body size  $L$ , fluid density  $\rho$ , and surface tension coefficient  $\sigma$ ? (10%)
3. The viscosity moment on a rotating disk is  $M = (\pi \mu \Omega R^4)/(2h)$ . If the uncertainty of each of the four variables ( $\mu$ ,  $\Omega$ ,  $R$ ,  $h$ ) is 1.0 percent, what is the estimated overall uncertainty of the moment  $M$ ? (10%)
4. On a sea-level standard day, a pressure gage, moored below the surface of the ocean ( $SG = 1.025$ ), reads an absolute pressure of 1.4 MPa. How deep is the instrument? (10%)
5. A solid 1-m-diameter sphere floats at the interface between water ( $SG = 1.0$ ) and mercury ( $SG = 13.56$ ) such that 40 percent is in the water. What is the specific gravity of the sphere? (10%)
6. Archimedes 在約紀元前 3 世紀發現了兩個 laws of buoyancy，其中一個為“A floating body displaces its own weight in a fluid in which it floats”。請仔細研讀該文字（注意 floats），並(a)試繪圖解釋其意義(b)以流體壓力觀念加以證明。(10%)
7. A wastewater pump is discharging at a rate of  $0.5 \text{ m}^3/\text{s}$ . It has a discharge nozzle diameter of 350 mm and a suction nozzle diameter of 400 mm. The reading on the discharge gage located at the pump centerline is  $125 \text{ kN/m}^2$ . The value on the suction gage located 0.6 m below the pump centerline is  $10 \text{ kN/m}^2$ . Determine (1) the head on the pump with Bernoulli's equation, and (2) the power input to the motor. Assume that the pump efficiency is 82 percent and that the motor efficiency is 91 percent. (10%)



8. 有一文式管(Venturi tube)如圖所示，請推導其流量。(15%)



9. 有一噴流衝擊一水平放置之平板，如圖所示其角度為  $\theta$ ，若衝擊後之能量損失不計，試求分流之流量及作用力。(15%)

