Worksheet: Mechanical Properties of Fluids

NIOS · Class 11 · Physics · 10 questions · 31 marks

Name: _____ Date: _____ Score: _____ / 31

Q1. Why is pressure called a scalar quantity even though it is defined as force divided by area? *[2 marks]*

Q2. A hydraulic lift has a small piston of area 10 cm^2 and a large piston of area 400 cm^2. A force of 50 N is applied to the small piston. Find the force on the large piston. *[2 marks]*

Q3. Why does a liquid drop with no external forces on it always take a spherical shape? *[2 marks]*

Q4. Water flows through a horizontal pipe that narrows from area 8 cm^2 to area 2 cm^2. If the speed in the wider section is 1.5 m/s, find the speed in the narrower section and the pressure difference between them (density of water = 1000 kg/m^3). *[3 marks]*

Q5. A steel ball of radius 1.0 mm falls through glycerine of viscosity 0.83 Pa s and reaches a terminal velocity of 1.0 cm/s. Take density of steel = 7800 kg/m^3 and glycerine = 1260 kg/m^3. Verify this is consistent with v_t = 2a^2(rho - sigma)g/9eta. *[3 marks]*

Q6. Find the excess pressure inside a soap bubble of radius 2.0 mm if the surface tension of the soap solution is 3.0 x 10^-2 N/m. *[3 marks]*

Q7. Find the pressure at a depth of 15 m in sea water of density 1030 kg/m^3, given atmospheric pressure is 1.01 x 10^5 Pa. *[3 marks]*

Q8. Water rises 3.0 cm in a capillary tube of radius 0.5 mm. Find the surface tension of water, taking the angle of contact as zero and density 1000 kg/m^3. *[3 marks]*

Q9. A large tank filled with water to a height of 5 m has a small hole at a height of 2 m from the bottom. Find the speed of efflux and the horizontal distance from the tank at which the stream hits the ground. *[5 marks]*

Q10. Two capillary tubes of the same length but radii r and 2r are connected in series, and the same liquid flows through both under a total pressure difference of þ. Find what fraction of the total pressure drop occurs across the narrower tube. *[5 marks]*