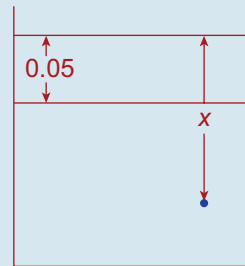


Q. 12. Pressure at 5 cm = $h\rho g$
 $= (0.05)(900)g$
 $= 45g$
 Pressure at 9.5 cm = $(0.05)(900)g + (0.045)(1,000)g$
 $= 90g$
 \therefore Pressure at 9.5 cm = Twice pressure at 5 cm
 Pressure at 3 cm = $(0.03)(900)g$
 $= 27g$
 5 times pressure at 3 cm = 135g
 Let x = the depth (in metres)
 Pressure = $(0.05)(900)g + (x - 0.05)(1,000)g = 135g$
 $\Rightarrow 45g + 1,000g - 50g = 135g$
 $\Rightarrow x = 0.14 \text{ m}$
 $= 14 \text{ cm}$



Q. 13. Let A = Atmospheric pressure
 Pressure at 14 m = $2 \times$ Pressure at 2 m
 $A + 14(1,000)g = 2(A + 2(1,000)g)$
 $\Rightarrow A = 10,000g$
 $= 98,000 \text{ N/m}^2$

Q. 14. (i) Buoyancy = weight of liquid displaced
 $= \left(\frac{2}{3}\pi(1)^3\right)(1,000)g$
 $= \frac{2,000}{3}\pi g \text{ N}$

(ii) Pressure = $h\rho g$
 $= (2)(1,000)g$
 $= 2,000g$

Thrust = $P \times A$
 $= (2,000g)(\pi(1)^2)$
 $= 2,000\pi g \text{ N}$

(iii) $B = Fu - Fd$
 $\Rightarrow \frac{2,000}{3}\pi g = 2,000\pi g - Fd$
 $\Rightarrow Fd = \frac{4,000}{3}\pi g \text{ N}$

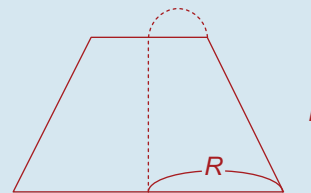
Q. 15. (i) Buoyancy = weight of displaced liquid
 $= \left(\frac{1}{3}\pi(2)^2(6)\right)(900)g$
 $= 7,200\pi g \text{ N}$

(ii) Pressure = $h\rho g$
 $= (7)(900)g = 6,300g \text{ N}$

Thrust = $P \times A$
 $= (6,300g)(\pi(2)^2)$
 $= 25,200\pi g \text{ N}$

(iii) $B = Fu - Fd$
 $\Rightarrow 7,200\pi g = 25,200\pi g - Fd$
 $\Rightarrow Fd = 18,000\pi g \text{ N}$

Q. 16.



Since $\pi r^2 = \frac{1}{4}(\pi R^2)$, $R = 2r$

Volume = $\frac{1}{3}\pi h\{(2r)^2 + (2r)r + r^2\}$
 $= \frac{7}{3}\pi h r^2$

Weight = $V\rho g = \frac{7}{3}\pi h r^2 \rho g$