Pressure at base $= h\rho g$

$\therefore$ Thrust $= P \times A = (h\rho g)(\pi(2r)^2)$

$= 4\pi hr^2\rho g$

Ratio, Thrust : Weight

$= 4\pi hr^2\rho g : \frac{7}{3}\pi hr^2\rho g$

$= 12 : 7$

Q. 17. (i) $P = h\rho g = \left(\frac{1}{2}\right)(1{,}000)g = 500g$ N/m^2

(ii) $T = P \times A$

$= (500g)\left(\pi\left(\frac{1}{8}\right)^2\right)$

$= \frac{125}{16}\pi g$ N

(iii) $W = V\rho g$

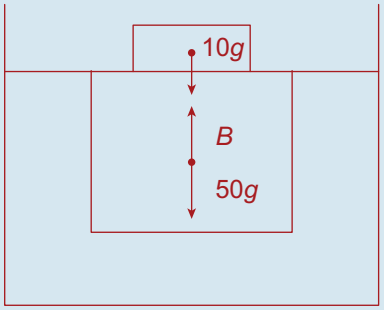
$= \frac{1}{3}\pi\left(\frac{1}{2}\right)\left\{\left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)\left(\frac{1}{8}\right) + \left(\frac{1}{8}\right)^2\right\}(1{,}000)g$

$= \frac{875}{16}\pi g$

$\therefore \frac{\text{Weight}}{T} = \frac{7}{1}$

Q. 18. Relative density of the wood $= \frac{3}{4} = 0.75$

$\therefore$ Volume $= \frac{M}{\rho} = \frac{50}{750} = \frac{1}{15}$ m^3



$B = 50g + 10g = 60g =$ Weight of liquid

$\Rightarrow 60g = \left(\frac{1}{15}\right)\rho g$

$\Rightarrow \rho = 60 \times 15 = 900$

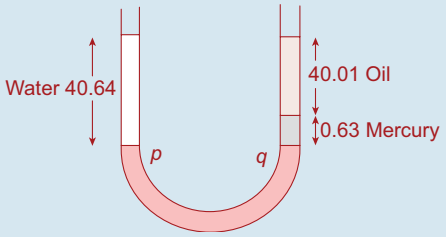
$\Rightarrow s = 0.9$

Q. 19. (i) $M = \rho V$

$= 13{,}600\left(\frac{1}{2}\right) = 6{,}800$ kg

$= 6.8$ tonnes

(ii)



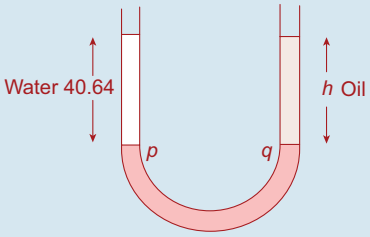
Pressure at p = Pressure at q

$\therefore (40.64)(1{,}000)g = (40.01)\rho g$

$+ (0.63)(13{,}600)g$

$\Rightarrow \rho = 801.6$ kg/m^3

(iii)

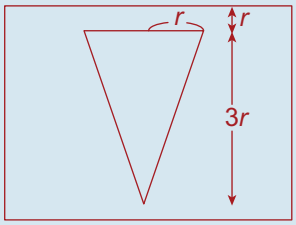


$(0.64)(1{,}000g) = h(801.6)g$

$\Rightarrow h = 50.7$ cm

$= 507$ mm

Q. 20.



(i) Pressure $= h\rho g = r\rho g$

Thrust $= P \times A = r\rho g(\pi r^2) = \pi r^3\rho g$ N

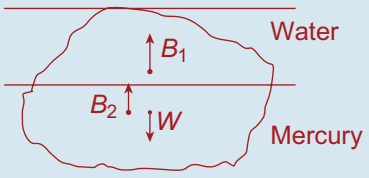
(ii) $B = V\rho g = (\frac{1}{3}\pi r^2(3r))\rho g = \pi r^3\rho g$

$B = Fu - Fd$

$\pi r^3\rho g = Fu - \pi r^3\rho g$

$Fu = 2\pi r^3\rho g$ N

Q. 21.



$W = V\rho g = (v_1 + v_2)(7{,}800)g$

$= 7{,}800(v_1 + v_2)g$

$B_1 = v_1(1{,}000)g = 1{,}000v_1g$

$B_2 = v_2(13{,}600)g = 13{,}600v_2g$