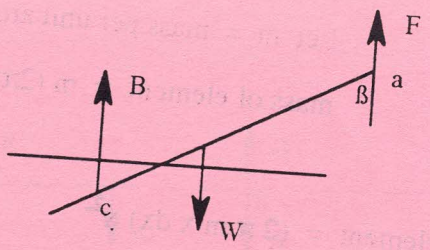
9 (a)



Forces B & W 5

$$|ac| = q + \frac{(h-q)}{2} = \frac{h+q}{2} \qquad 5$$

$$B = \frac{\frac{(h-q)W(1)}{h}}{s} = \frac{(h-q)W}{hs} \qquad 5$$

Moments about a

$$B\,|ac| \sin\beta = W(0.5\,h)\sin\beta$$

$$\frac{(h-q)}{hs}\,W\,\frac{(h+q)}{2} = \frac{Wh}{2} \qquad 5$$

$$\Rightarrow \quad h^2 - q^2 = h^2 s$$

$$q^2 = h^2(1-s)$$

5 25

(b) Equal volumes: $m_1 + m_2 =$ mass of mixture

$$\rho_1 V + \rho_2 V = \rho_3 (2V)$$

$$\rho_1 + \rho_2 = 2\rho_3 \qquad 5$$

$$s_1 + s_2 = 5 \qquad 5$$

Equal weights: $V_1 + V_2 =$ Volume of mixture

$$\frac{m}{\rho_1} + \frac{m}{\rho_2} = \frac{2m}{\rho_4} \qquad 5$$

$$\frac{1}{s_1} + \frac{1}{s_2} = \frac{2}{2.4} \qquad 5$$

$$s_1 + s_2 = \frac{2(s_1 s_2)}{2.4}$$

$$s_1 s_2 = 6$$

$$\Rightarrow \quad s_1 = 2 \text{ and } s_2 = 3 \qquad 5$$

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