BIO ASS: SOLUTION

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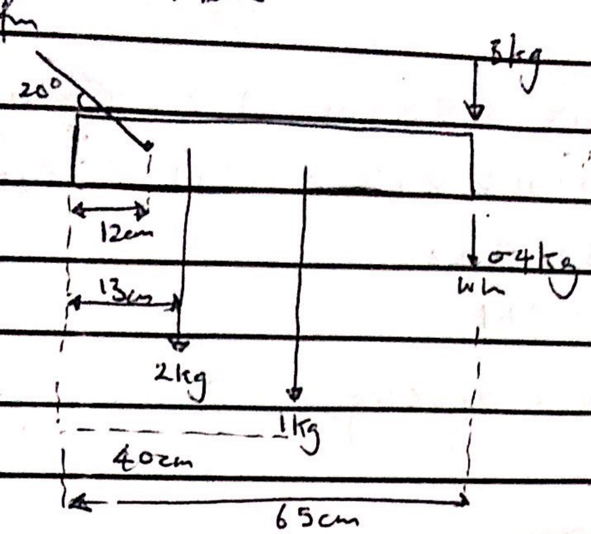
① 

Considering arm to m

$r F_s \sin\theta = rF_{wa} + rF_{wb} + r(w_h + w_B)(g)$ (9.81)

$12 \times 0.01 \times F_0 \sin 20° = (13 \times 0.01)(2 \times 9.81) + (40 \times 0.01)(1 \times 9.81)$
$+ (3 \times 0.4)(9.81)$

$0.0418 F_D = 2.5306 + 3.924 + 2.68$

$F_D = \frac{20.1546}{6.043}$

$F_D = 654.76N = 66.7kg$

$F_j - F_D + w_1 + w_2 + w_B = 0$

$\therefore F_j = F_D + w_1 + w_2 + w_B$
$= 66.7 + 2 + 1 + 3.4 =$
$= 66.7 - 2 - 1 - 3.4$
$= 60.3kg$

② Weight of forearm, c = 1.5kg
" " " palm = 10kg

$\theta = \tan^{-1}(5/20) = 14.04°$

Taking moment about F:

$\Sigma M_E = 0$

$(F \cos\theta \times P) = (C \times M_a) + (F \times V_c)$

$F\cos(14.04) \times (5 \times 0.01) = (15 \times 0.01 \times C) + (35 \times 0.01) \times (10 \times 9.8$

$0.049F = [0.015 \times 1.5 \times 9.81) + 34.335$

$= \frac{36.542}{0.049}$

$F = 745.76N = \frac{74.6kg}{2}$

forces along X-axis

$\Sigma f_x = 0$

$\Sigma_x = F\sin 14.04 = 0$

$= 74.6\sin(14.04) = 18.09kg$

$= \frac{18.09kg}{2}$

Forces along Y-axis

$\Sigma f_y = 0$

$\Sigma f_y = F\cos(14.04) - 1.5 - 10 = 0$

$= 72.57 - 1.5 - 10$

$= 60.87kg$

Resultant $= \sqrt{(\Sigma x^2 + \Sigma y^2)}$

$= \sqrt{18.09^2 + 60.87^2}$

$= \sqrt{4032.41}$

$= 63.50kg$

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