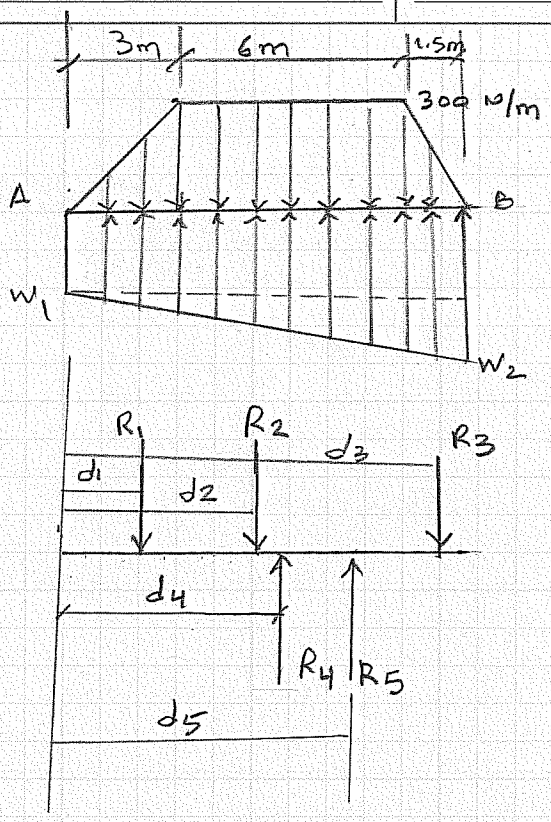


$R_1 = \frac{1}{2}(3)(300) = 450\ N$

$R_2\ (6)\ (300) = 1800\ N$

$R_3 = \frac{1}{2}(1.5)(300) = 225\ N$

$R_4 = (10.5)\,w_1$

$R_5 = \frac{1}{2}(10.5)(w_2 - w_1) = 5.25(w_2 - w_1)$

$d_1 = 2m$

$d_2 = 3 + 3 = 6m$

$d_3 = 3 + 6 + 0.5 = 9.5$

$d_4 = \frac{1}{2}(3+6+1.5) = 5.25\ m$

$d_5 = \frac{2}{3}(10.5) = 7\ m$

Condition 1: $R_1 + R_2 + R_3 = R_4 + R_5$

$450 + 1800 + 225 = 10.5 w_1 + 5.25(w_2 - w_1)$

$2475 = 5.25\,(w_2 + w_1)$

$w_2 + w_1 = 471.4\ N$ (1)

Condition 2: $\Sigma M_A = 0$ +5

$-d_1 R_1 - d_2 R_2 - d_3 R_3 + d_4 R_4 + d_5 R_5 = 0$

$$-2(450) - 6(1800) - 9.5(225) + 5.25(10.5W_1) + 7[5.25(W_2 - W_1)] = 0$$

$$-13837.5 + 55.125 W_1 + 36.75(W_2 - W_1) = 0$$

$$-13837.5 + 36.75 W_2 + 18.375 W_1 = 0$$

$$2W_2 + W_1 = 753.06 \quad (2)$$

From (1) $W_1 = 471.4 - W_2$ (3)

Sub (3) into (2) $2W_2 + 471.4 - W_2 = 753.06$

$W_2 = 281.66$ N (3)

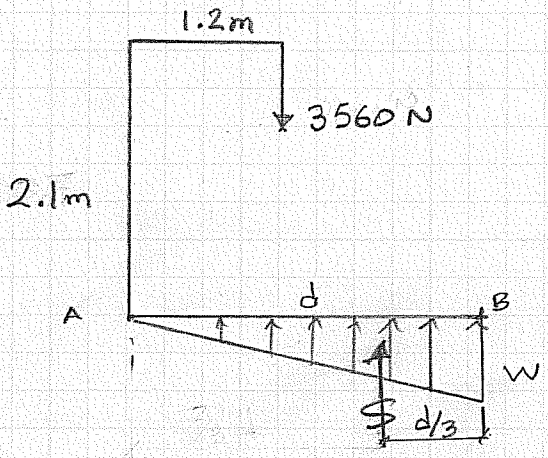
Sub (3) into (3) $W_1 = 189.74$ N (4)

1)

Find d & W so that

$\Sigma M_B = 0$

$\Sigma F_y = 0$



$R = \frac{1}{2} d\,W$

$+\circlearrowleft [\Sigma M_B = 0]\ [d - 1.2](3560) - [\frac{1}{2} d\,W][\frac{1}{3} d] = 0$

$3560d - 4272 - \frac{1}{6} d^2 W = 0$ (1)

$\Sigma F_y = -3560 + \frac{1}{2} d\,W = 0$

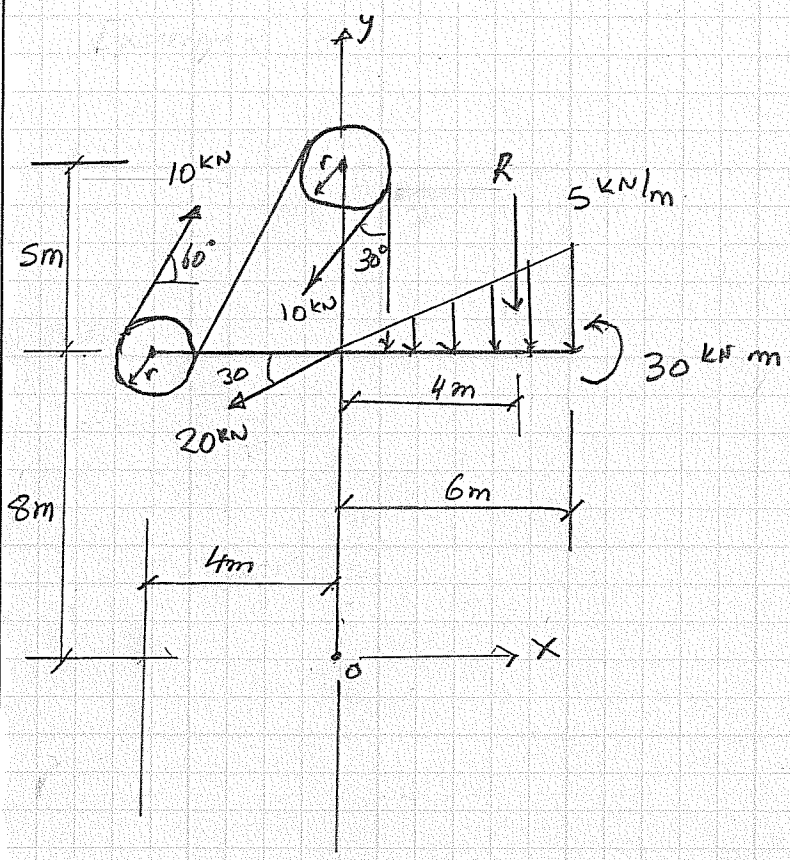
$d\,W = 7120$ (2)

Sub (2) into (1)

$3560d - 4272 - \frac{1}{6}[7120]d = 0$

$d = 1.8\ m$ (3)

Sub (3) into (2) $W = 3955.5\ N/m$ (4)



$r = 1\ m$

$R = \frac{1}{2}(6)(5) = 15^{KN}$

$\Sigma F_x = 10\cos 60 - 10\sin 30 - 20\cos 30 = -17.32^{KN}$

$\Sigma F_y = 10\sin 60 - 10\cos 30 - 20\sin 30 - 15 = -25.0$

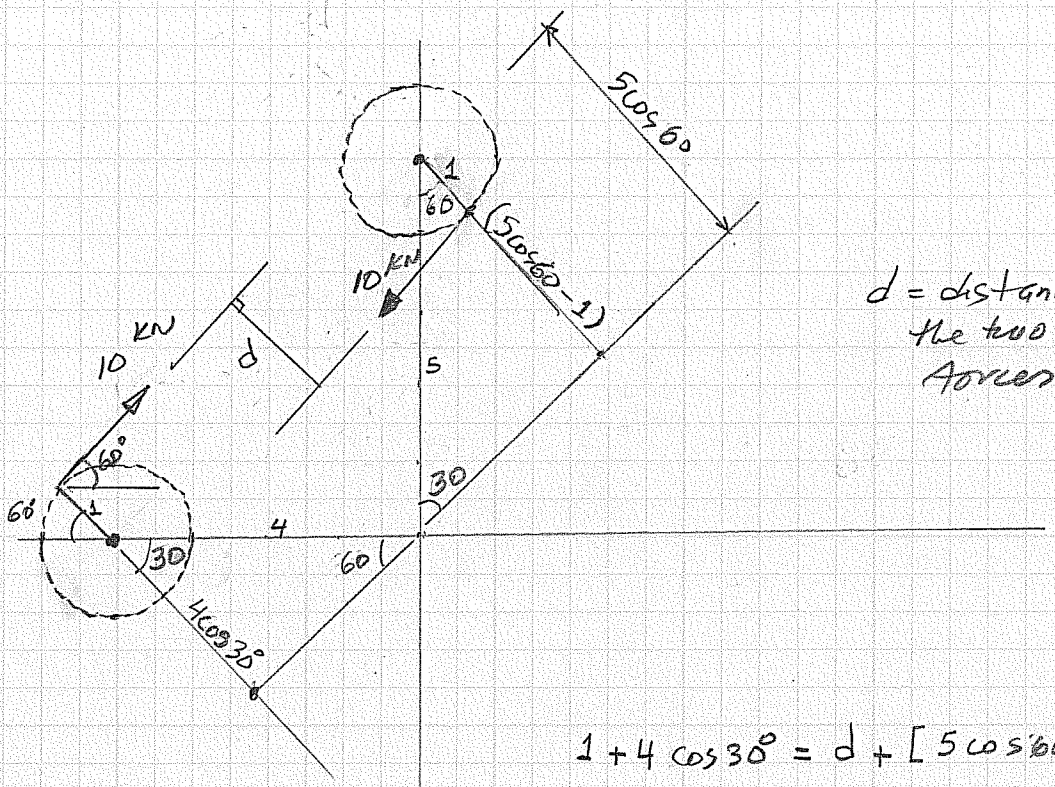
$\overset{+}{\circlearrowleft} \Sigma M_O = -(10\cos 60)(8) - (10\sin 60)(5) + (10\sin 30)(13) - (10\cos 30)(1)$

$+ (20\cos 30)(8) - 15(4) + 30$

$= \overbrace{-40 - 43.30 + 65 - 8.66 + 138.56 - 60 + 30}^{-28.25}$

$= 81.6\ KN\text{-}m$ (Approximate)

Note that here we assumed that the points of application of the 10 KN-forces are at $(8, -5)$ and $(1, 13)$, respectively. This, however, is not exact. A more accurate way would be to determine de perpendicular distance between the



d = distance between the two 10 KN forces

$$1 + 4\cos 30^\circ = d + [5\cos 60^\circ - 1]$$

$$d = 1 + 4\cos 30^\circ - 5\cos 60^\circ + 1$$

$$= 2.96 \text{ m}$$

$$M_{couple} = -10(2.96) = -29.6 \text{ KN-m}$$

$$\therefore M_O = -29.6 + 138.56 - 60 + 30 = 78.96 \text{ KN-m}$$