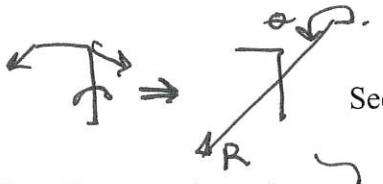
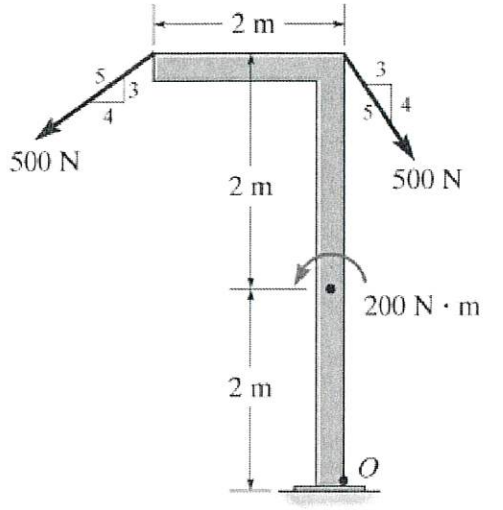


Example #1: Determine the resultant force of the system vertically from point O. Determine the resultant force of the system horizontally from point O.



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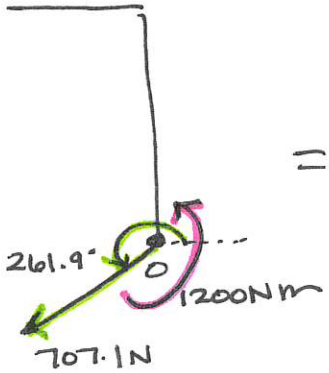

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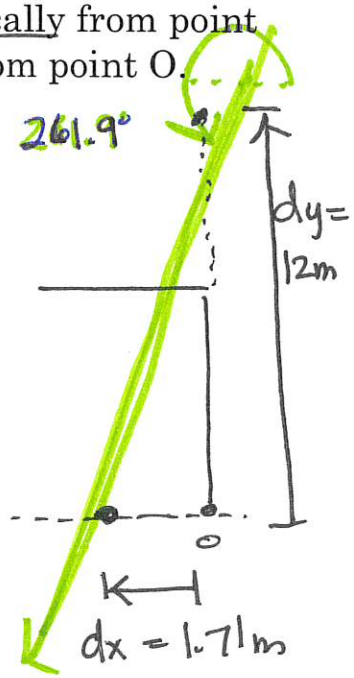
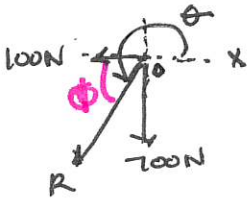


① RESULTANT FORCE $|R|, \theta$

$R_x = \Sigma F_x \rightarrow = -\frac{4}{5}(500N) + \frac{3}{5}(500N) = -100N = 100N \leftarrow$

$R_y = \Sigma F_y \uparrow = -\frac{3}{5}(500N) - \frac{4}{5}(500N) = -700N = 700N \downarrow$

$R = \sqrt{(-100N)^2 + (-700N)^2} = \boxed{707.1N}$



$\theta = 180° + \phi = 180° + \tan^{-1}\frac{700N}{100N} = 180° + 81.9°$

$\boxed{\theta = 261.9°}$

② MOMENT ABOUT POINT O

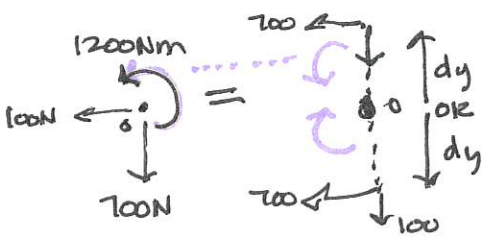
$\Sigma M_O = \frac{4}{5}(500N)(4m) + \frac{3}{5}(500N)(2m) - \frac{3}{5}(500N)(4m) - \frac{4}{5}(500N)(0m)$

$+200Nm = 1200Nm$

$\boxed{R_{M_O} = 1200Nm \circlearrowleft}$

③ REDUCE TO GET RID OF 1200Nm MOMENT (R_{M_O})

VERTICAL ↑ OR ↓

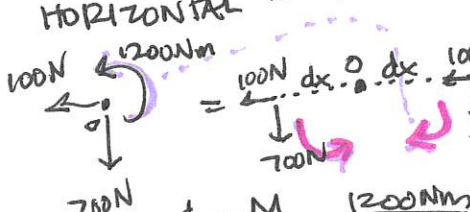


$M = Fxdy$

$dy = \frac{M}{F_x} = \frac{1200Nm}{100N}$

$\boxed{dy = 12m \uparrow}$

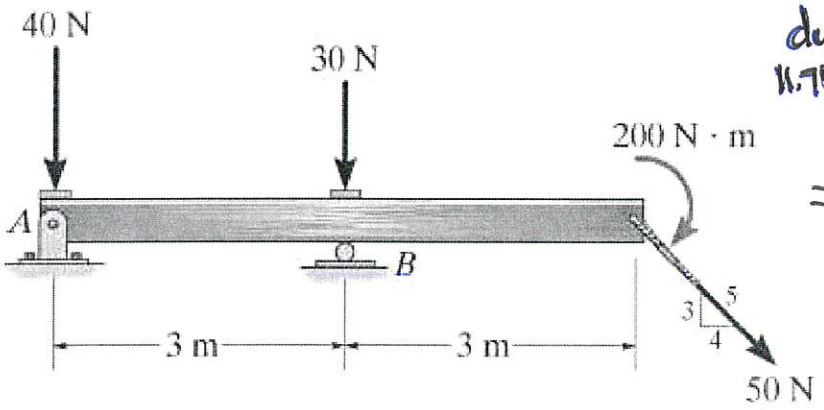
HORIZONTAL ← OR →

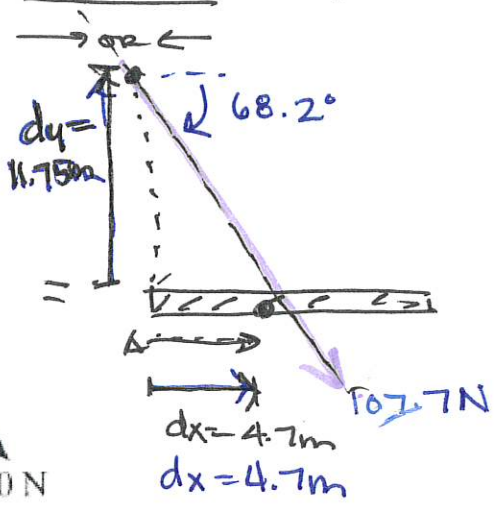


$dx = \frac{M}{F_y} = \frac{1200Nm}{700m} = 1.71m$

$\boxed{dx = 1.71m \leftarrow}$

Example #2: Determine the resultant force of the system vertically from point A. Determine the resultant force of the system horizontally from point A.



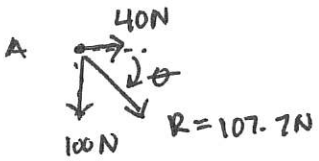


① RESULTANT FORCE

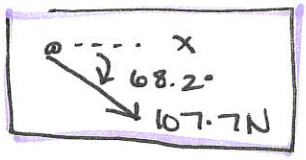
$R_x = \Sigma \vec{F}_x = \frac{4}{5}(50N) = 40N \rightarrow$

$R_y = \Sigma F_y \uparrow = -40N - 30N - \frac{3}{5}(50N) = -100N = 100N \downarrow$

$R = \sqrt{(40N)^2 + (-100N)^2} = 107.7N$



$\tan\theta = \frac{100N}{40N} \rightsquigarrow \theta = -\left[\tan^{-1}\frac{100N}{40N}\right] = -68.2°$



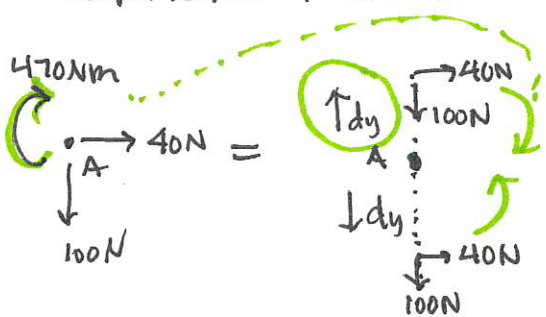
② RESULTANT MOMENT

$\Sigma M_A \circlearrowleft = -30N(3m) - 200Nm - \frac{3}{5}(50N)(6m) = -470Nm$

$R_{M_A} = 470\ Nm \circlearrowright$

③ REDUCE TO GET RID OF R_{M_A}

VERTICAL ↑ OR ↓

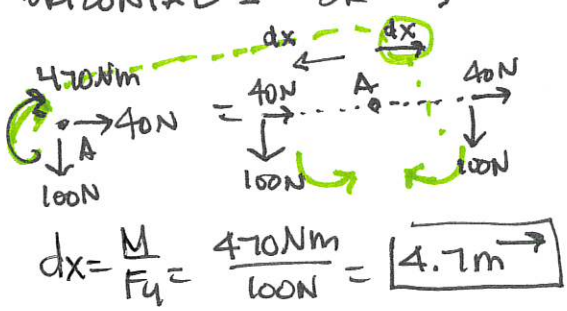


$M = Fxdy$

$dy = \frac{470Nm}{40n}$

$\boxed{dy = 11.75m \uparrow}$

HORIZONTAL ← OR →



$dx = \frac{M}{F_y} = \frac{470Nm}{100N} = \boxed{4.7m \rightarrow}$