(C) POTENTIAL ENERGY + KINETIC ENERGY + TERMIC ENERGY

$E_{PA} = E_{PC} + E_{CC} + Q_{AC}$

$\gamma m h_1 = \gamma m h_2 + \frac{1}{2} m v_C^2 + F_{ATT} \cdot AC$

$2\gamma m h_1 = 2\gamma m h_2 + m v_C^2 + 2 F_{ATT} \cdot AC$

$v_C = \sqrt{\frac{2\gamma m h_1 - 2\gamma m h_2 - 2 F_{ATT} AC}{m}} = \sqrt{\frac{(2 \cdot 9,8\,J/kgm \cdot 2400\,kg \cdot 50m) - (2 \cdot 9,8\,J/kgm \cdot 2400\,kg \cdot 26m) - (2 \cdot 770,1\,N \cdot 123m)}{2400\,kg}}$

$v_{CC} = 19,8\,m/s = (19,8 \cdot 3,6)\,km/h = 71,2\,km/h$

$E_{CC} = \frac{1}{2} m v_C^2 = \frac{1}{2} \cdot 2400\,kg \cdot 392,04\,m^2/s^2 = 470448\,J$

$E_{PC} = \gamma m h_2 = 9,8\,\frac{J}{kgm} \cdot 2400\,kg \cdot 26m = 611520\,J$

$Q_{AC} = F_{ATT} \cdot AC = 770,1\,N \cdot 123m = 94722\,J$

(D) POTENTIAL ENERGY + KINETIC ENERGY + TERMIC ENERGY

$E_{PA} = E_{PD} + E_{CD} + Q_{AD}$

$\gamma m h_1 = \gamma m h_3 + \frac{1}{2} m v_D^2 + F_{ATT} \cdot AD$

$2\gamma m h_1 = 2\gamma m h_3 + m v_D^2 + 2 F_{ATT} \cdot AD$

$v_D = \sqrt{\frac{2\gamma m h_1 - 2\gamma m h_3 - 2 F_{ATT} AD}{m}} = \sqrt{\frac{(2 \cdot 9,8\,J/kgm \cdot 2400\,kg \cdot 50m) - (2 \cdot 9,8\,J/kgm \cdot 2400\,kg \cdot 36m) - (770,1\,N \cdot 140m)}{2400\,kg}}$

$v_D = 13,6\,m/s = (13,6 \cdot 3,6)\,km/h = 49\,km/h$

$E_{CD} = \frac{1}{2} m v_D^2 = \frac{1}{2} \cdot 2400\,kg \cdot 184,96\,m^2/s^2 = 221952\,J$

$E_{PD} = \gamma m h_3 = 9,8\,\frac{J}{kgm} \cdot 2400\,kg \cdot 36m = 846720\,J$

$Q_{AD} = F_{ATT} \cdot AD = 770,1\,N \cdot 140m = 107814\,J$

(E) POTENTIAL ENERGY + KINETIC ENERGY + TERMIC ENERGY

$E_{PA} = E_{PE} + E_{CE} + Q_{AE}$

$\gamma m h_1 = \gamma m h_2 + \frac{1}{2} m v_E^2 + F_{ATT} \cdot AE$

$2\gamma m h_1 = 2\gamma m h_2 + m v_E^2 + 2 F_{ATT} \cdot AE$

$v_E = \sqrt{\frac{2\gamma m h_1 - 2\gamma m h_2 - 2 F_{ATT} AE}{m}} = \sqrt{\frac{(2 \cdot 9,8\,J/kgm \cdot 2400\,kg \cdot 50m) - (2 \cdot 9,8\,J/kgm \cdot 2400\,kg \cdot 26m) - (770,1 \cdot 2 \cdot 156m)}{2400\,kg}}$

$v_E = 19,2\,m/s = (19,2 \cdot 3,6)\,km/h = 69,3\,km/h$

$E_{CE} = \frac{1}{2} m v_E^2 = \frac{1}{2} \cdot 2400\,kg \cdot 368,64\,m^2/s^2 = 442368\,J$

$E_{PE} = \gamma m h_2 = 9,8\,J/kgm \cdot 2400\,kg \cdot 26\,m = 611520\,J$

$Q_{AE} = F_{ATT} \cdot AE = 770,1\,N \cdot 156\,m = 120136\,J$