Multibody Drill I

1) Find the acceleration and the tension in the rope between the 2 masses. Assume μ = 0.

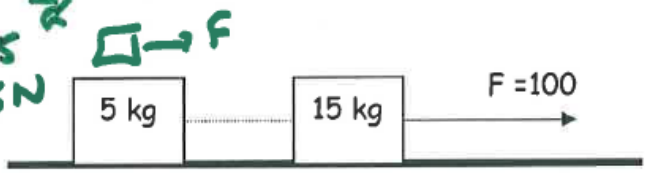
$F_{NET} = ma$

$100 = 20a$

$a = 5\ m/s^2$

$F = 5 \cdot 5$

$F = 25N$



2) Repeat if μ = 0.2.

$F_{NET} = ma$

$100 - (0.2)(20)(9.8) = 20a$

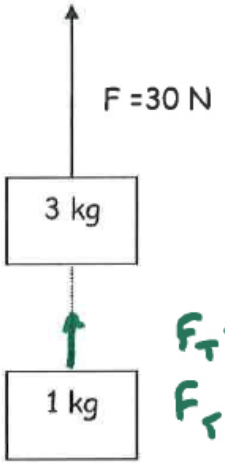
$a = 3.04\ m/s^2$

$F_{NET} = ma$

$F - (0.2)(5)(9.8) = (5)(3.04)$

$F = 25N$

3) Find the acceleration and the tension in the rope between the 2 masses.



$F_{NET} = ma$

$30 - 4 \cdot 9.8 = 4a$

$a = -2.3\ m/s^2$

$F_T - 9.8 = -2.3$

$F_T = 7.5N$

4) Find the forces required to accelerate the 2 masses at a rate of +2.5 m/s^2.

$F_{NET} = ma$

$F - 4 \cdot 9.8 = 4 \cdot 2.5$

$F = 49.2\ N$

$F_T - 9.8 = +2.5$

$F_T = 12.3N$

5) Find the acceleration and the tension in the 2 ropes if the surface is frictionless.

$F_{NET} = ma$

$3.5 \cdot 9.8 - 3.0 \cdot 9.8 = 8.5a$

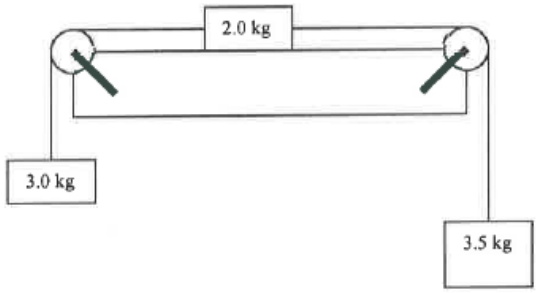
$a = 0.58\ m/s^2$

6) Repeat if the coefficient of kinetic friction is 0.10

$3.5 \cdot 9.8 - 3.0 \cdot 9.8 - 1.96 = 8.5a$

$a = 0.35\ m/s^2$

7) Find the minumum coefficient of kinetic friction that prevents the system from moving.



$3.5 \cdot 9.8 - 3.0 \cdot 9.8 - F_f = 0$

$F_f = 4.9N$

$\mu mg = 4.9N \quad \mu = 0.25$