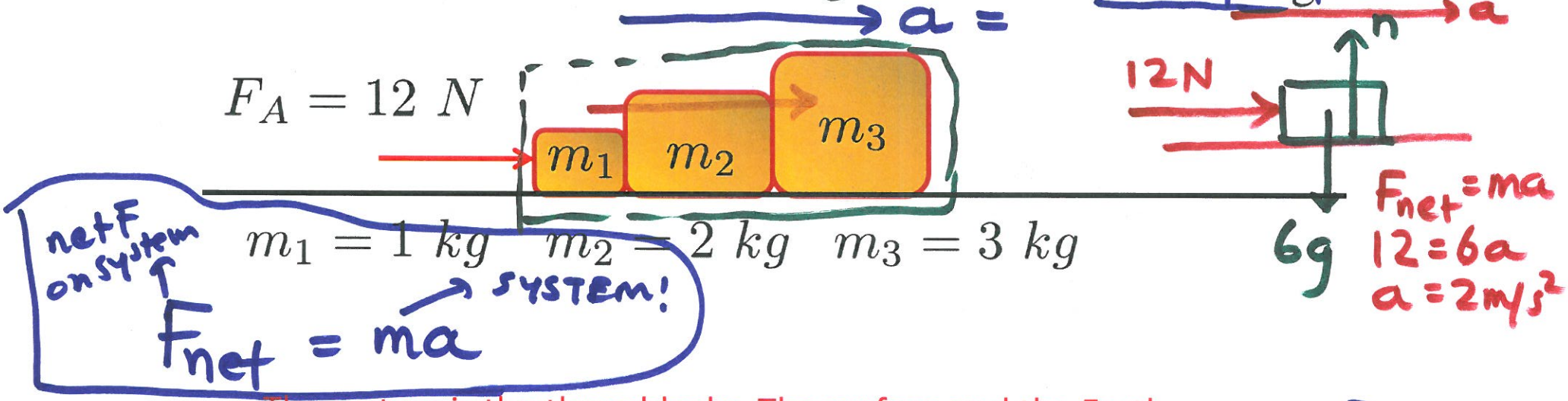
OK, Now Let's Solve Problem 7-10: Whiteboard 7.1

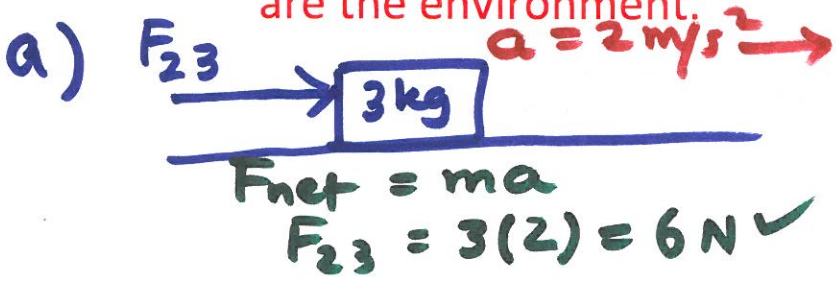
9. ‖ Blocks with masses of 1 kg, 2 kg, and 3 kg are lined up in a row on a frictionless table. All three are pushed forward by a 12 N force applied to the 1 kg block.

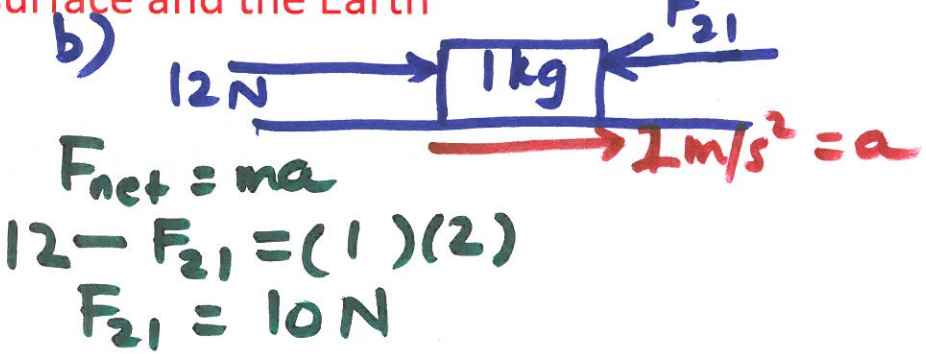
a. How much force does the 2 kg block exert on the 3 kg block?

b. How much force does the 2 kg block exert on the 1 kg block?



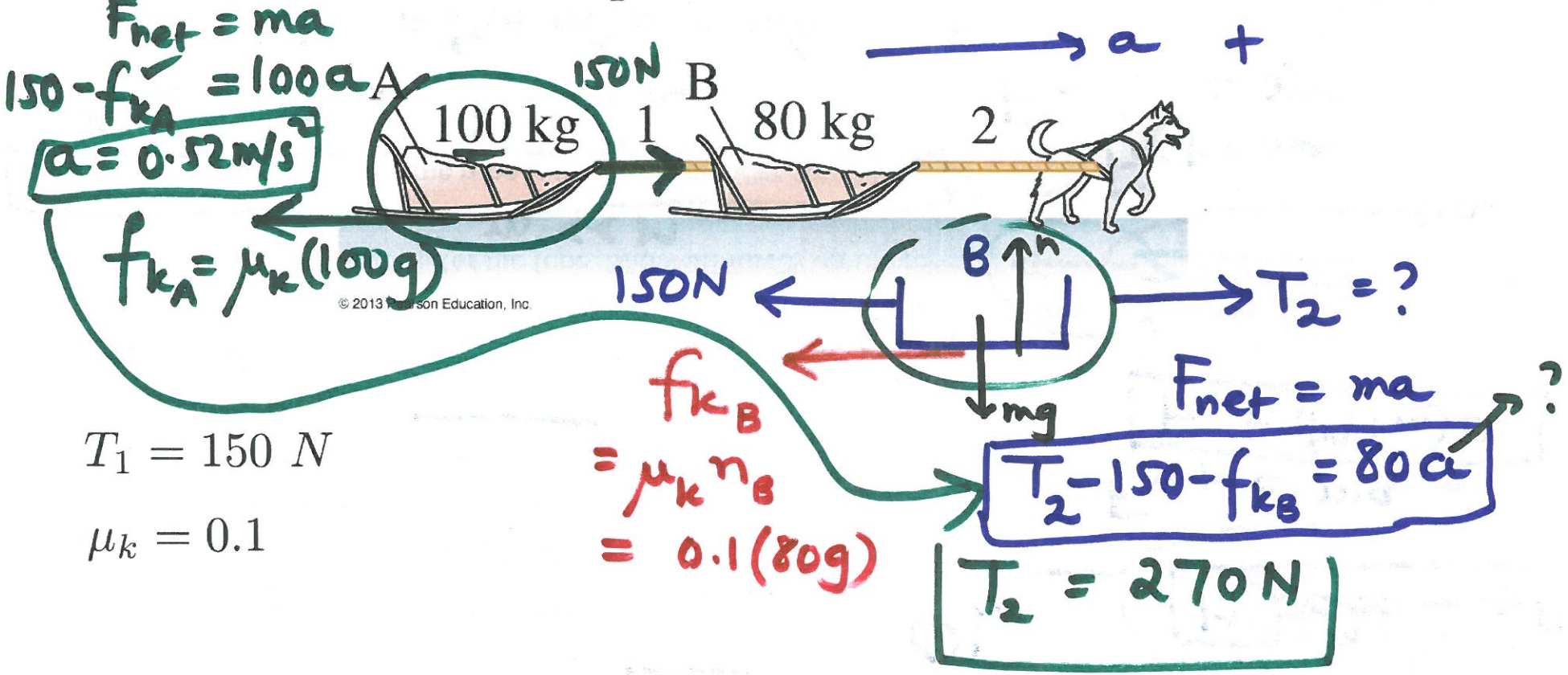
The system is the three blocks. The surface and the Earth are the environment.





Problem 7-23: Whiteboard Problem 7.2

14. ‖ The sled dog in FIGURE P7.23 drags sleds A and B across the snow. The coefficient of friction between the sleds and the snow is 0.10. If the tension in rope 1 is 150 N, what is the tension in rope 2?



$F_{net} = ma$

$150 - f_{k_A} = 100a$

$a = 0.52 m/s^2$

$f_{k_A} = \mu_k (100g)$

$f_{k_B} = \mu_k n_B = 0.1(80g)$

$F_{net} = ma$

$T_2 - 150 - f_{k_B} = 80a$

$T_2 = 270 N$

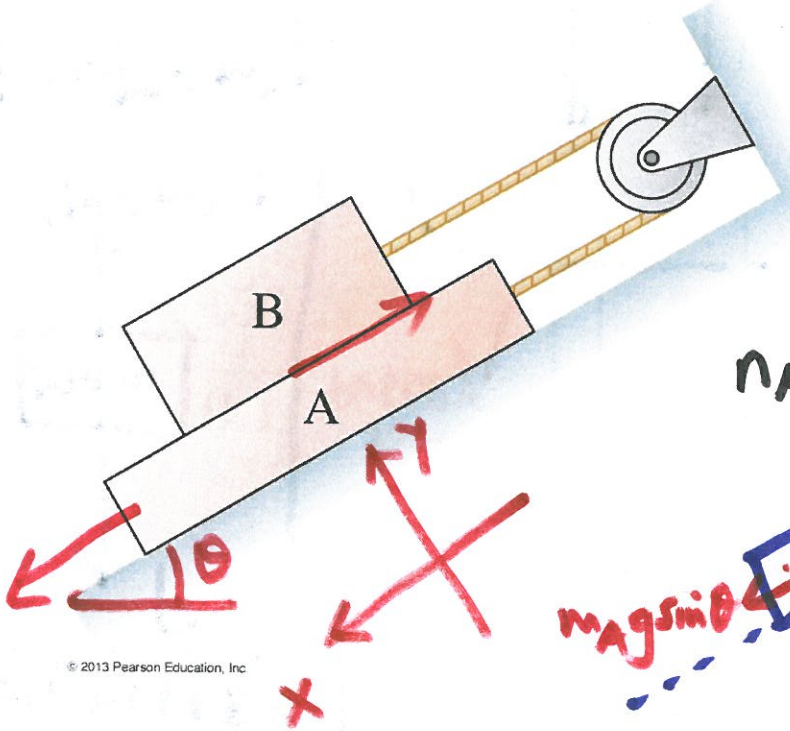
$T_1 = 150\ N$

$\mu_k = 0.1$

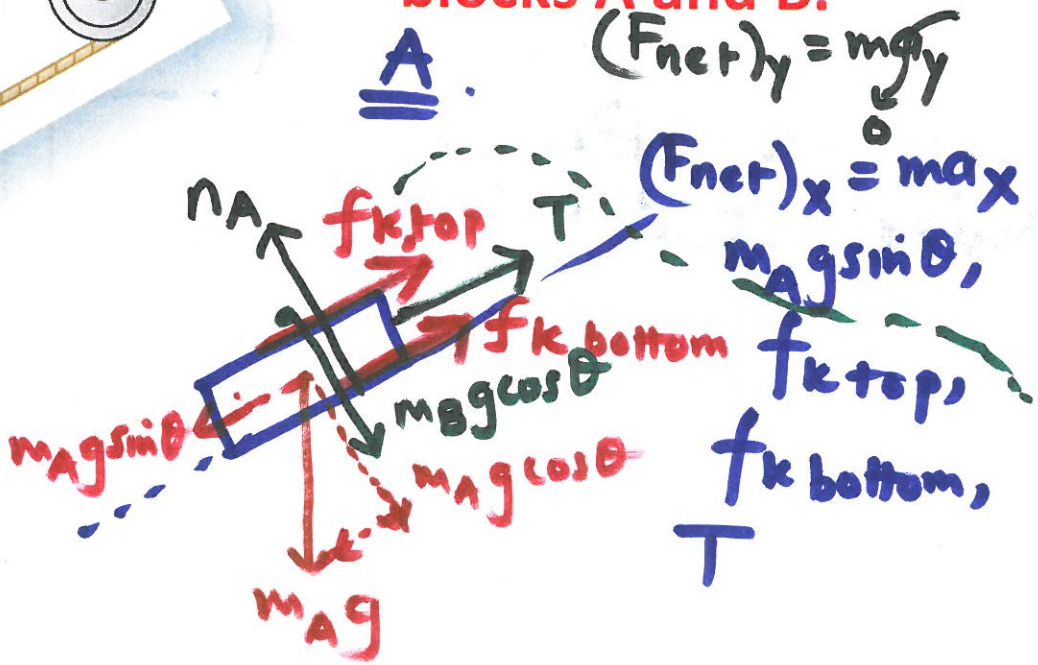
Acceleration Constraint: $a_{x_A} = a_{x_B} = a$

Whiteboard Problem 7.3, Problem 7.4 in book

4. ‖ Block A in FIGURE EX7.5 is heavier than block B and is sliding down the incline. All surfaces have friction. The rope is massless, and the massless pulley turns on frictionless bearings. The rope and the pulley are among the interacting objects, but you'll have to decide if they're part of the system.



Draw free body diagrams for blocks A and B.

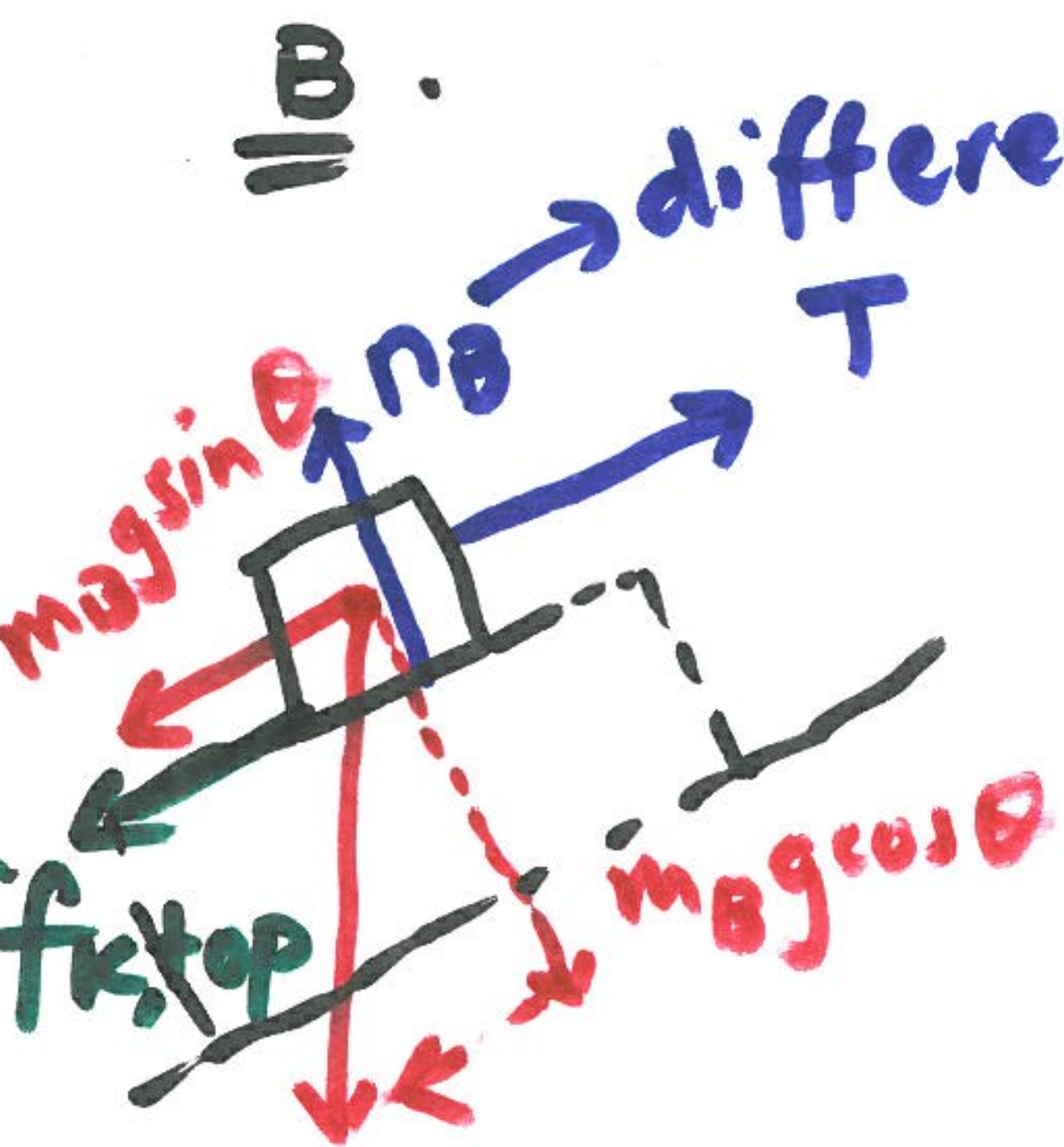


B.

r_B → different from r_A!

T

$mg\sin\theta$

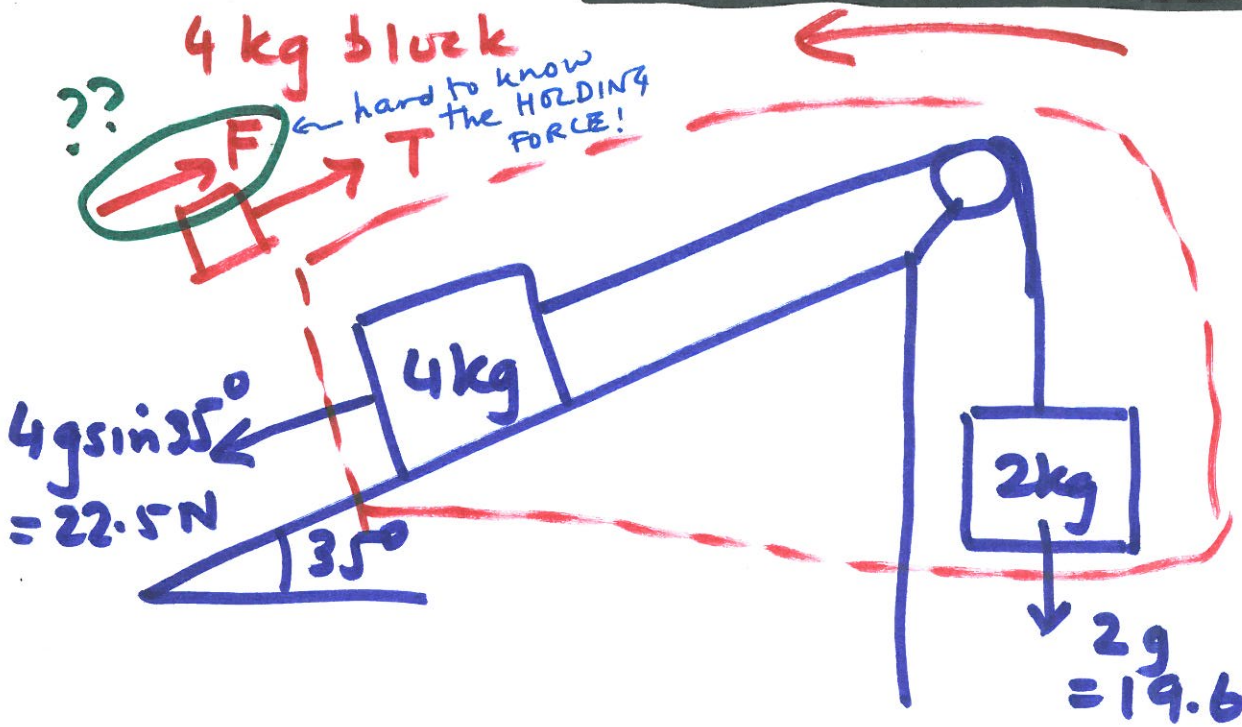


$f_{k,top}$

$mg\cos\theta$

mg

WHITE BOARD PROBLEM 7-4 (PROBLEM 7-40)



a) 4 kg held in place

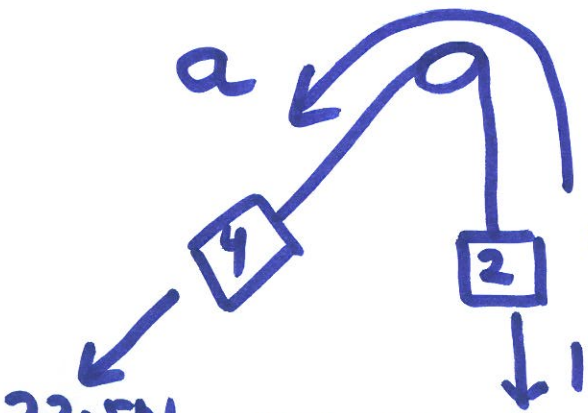
FOCUS ON 2kg BLOCK

$F_{net} = ma$

$T = 2g$

$T = 19.6\,N$

b) DEFINE SYSTEM AS RED SQUARE (4kg + 2kg)

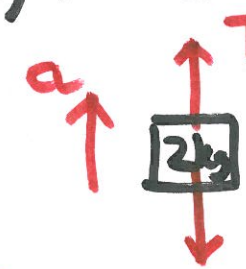


$F_{net} = ma$

$22.5 - 19.6 = (4+2)a$ —(i)

$\Rightarrow a = 0.48\,m/s^2$

c) FIND TENSION.



$2g = 19.6$

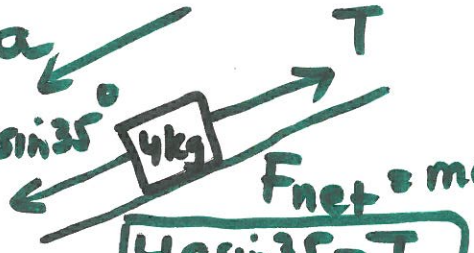
$F_{net} = ma$

$T - 2g = 2a$ —(ii)

$T = 2(g+a)$

$= 2(9.8 + 0.48)$

$= 20.6\,N$



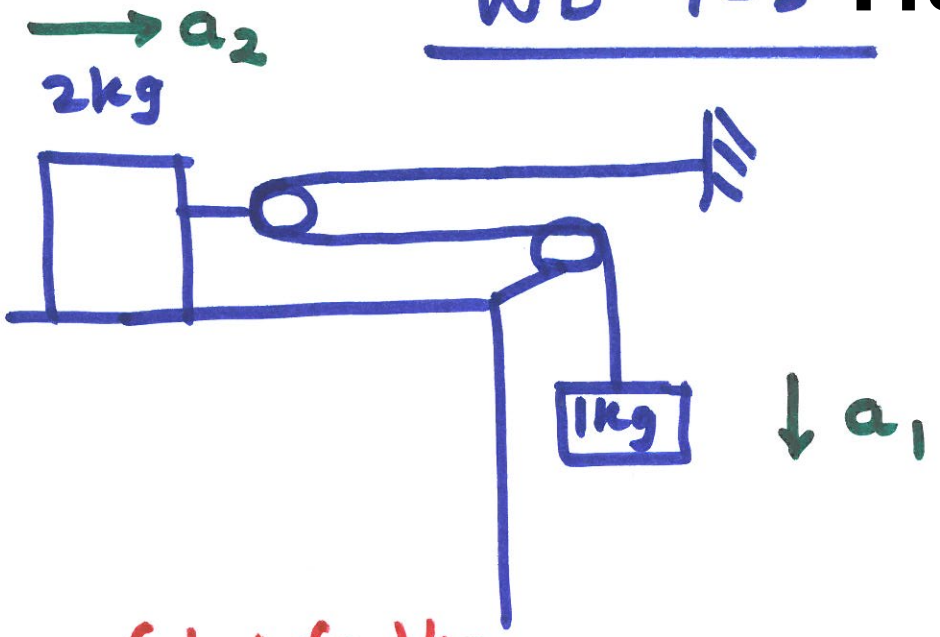
$F_{net} = ma$

$4g\sin35 - T = 4a$ —(iii)

SOLVE FOR 'a', plonkin other to find T

NOTE! YOU MAY SETUP ANY TWO OF EQUATIONS (i), (ii) or (iii) TO SOLVE THIS PROBLEM. YOU DON'T NEED ALL THREE !!

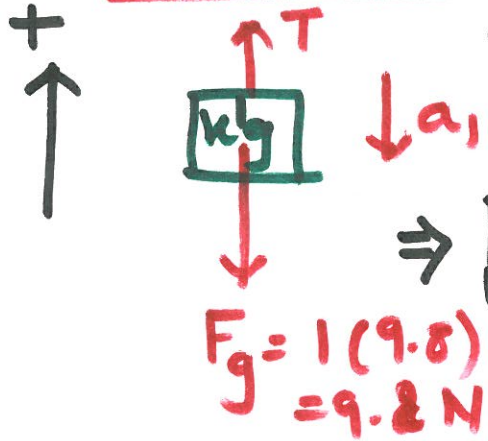
WB 7-5 Problem 7-55



For every '1m' dropped by '1kg' block, the other block moves forward by 0.5m (b/c 1m divided equally between 2 strings).

$$a_2 = 0.5a_1$$

f.b.d. for 1kg



$$T - 9.8 = 1(-a_1)$$

$$\Rightarrow 9.8 - T = a_1$$

f.b.d. for 2kg

$$2T = 2a_2$$

$$T = a_2 = 0.5a_1$$

$$9.8 - 0.5a_1 = a_1$$

$$\tfrac{3}{2}a_1 = 9.8 \Rightarrow a_1 = \tfrac{2}{3}(9.8)$$

$$= 6.5\ m/s^2$$

$$a_2 = 3.25\ m/s^2$$

Tension in string?

$T = 3.25\ N$