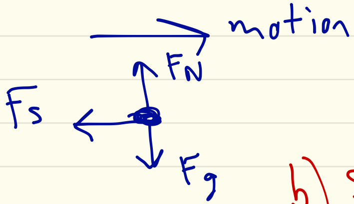
Pg 175 # 1 b.

Person 1	Person 2
$m = 59\ kg$	
$\mu_s = 0.52$	$\mu_s = 0.66$

a) $F_{NET} = ma$



$F_s = F_{NET}$

$F_s = ma$

$\mu_s F_N = ma$

$\mu_s mg = ma$

b) Since m is a factor in both sides of equation

It divides out.

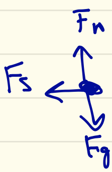
Pg 178 #1.

attempted motion →

Object:

$m = 250\,kg$

$\mu_s = 0.55$



$F_s = \mu_s m g$

$F_s = (0.55)(250\,kg)(9.8\,\frac{m}{s^2})$

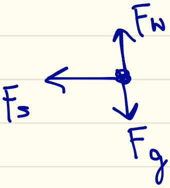
$F_s = 1347.5\,N$

$F_s = 1300\,N.$

Student

$m = 64\,kg$

$\mu_s = 0.72$



$F_s = \mu_s m g$

$= (0.72)(64\,kg)(9.8\,\frac{m}{s^2})$

$F_s = 451\,N$

$F_s = 450\,N.$

c) Not fair.

More Solving Friction Problems

Unit 2: Dynamics

Oct. 25, 2016

Pg. 177 #3

3. A string is tied to a 3.2 kg object on a table and a 1.5 kg object hanging over a pulley (**Figure 12**). The coefficient of kinetic friction between the 3.2 kg object and the table is 0.30. T/I
   (a) Calculate the acceleration of each object. [ans: 1.1 m/s^2 [R]; 1.1 m/s^2 [down]]
   (b) Determine the magnitude of the tension in the string. [ans: 13 N]
   (c) How far will the objects move in 1.2 s if the initial velocity of the 3.2 kg object is 1.3 m/s [right]? [ans: 2.4 m]

FBD OBJECT → +

FBD Mass ↓ +

$a_{object} = a_{mass}$

$F_{NET} = ma$
$F_{NET} = F_T - F_k$
$F_k = \mu_k F_N$
$F_N = mg$

2 unknowns
① F_T
② acceleration.

$ma = F_T - \mu_k mg$ (object) $m = 3.2$ kg.

$F_{NET} = ma$
$F_{NET} = F_g - F_T$
$F_g = mg$
$ma = mg - F_T$ (mass) $m = 1.5$ kg.

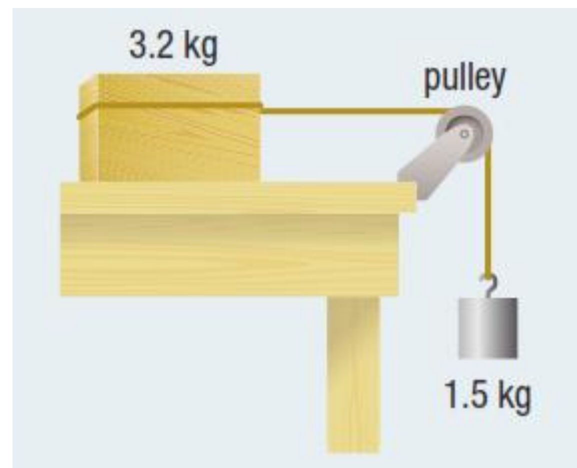


Figure 12

$\rightarrow +$

Object.

$(3.2\,kg)a = F_T - (0.30)(3.2\,kg)(9.8\,\frac{m}{s^2})$

$(3.2\,kg)\vec{a} = F_T - 9.408\,N$

$(3.2\,kg)\vec{a} = F_T - 9.41\,N$

Isolate F_T

$F_T = (3.2\,kg)\vec{a} + 9.41\,N$

Substitute

mass $\downarrow$

$(1.5\,kg)\vec{a} = (1.5\,kg)(9.8\,\frac{m}{s^2}) - F_T$

$(1.5\,kg)\vec{a} = 14.7\,N - F_T$

$(1.5\,kg)\vec{a} = 14.7\,N - ((3.2\,kg)\vec{a} + 9.41\,N)$

$(1.5\,kg)\vec{a} = 14.7\,N - (3.2\,kg)\vec{a} - 9.41\,N$

$(1.5\,kg\,\vec{a}) + (3.2\,kg)\vec{a} = 14.7\,N - 9.41\,N$

$(4.7\,kg)\vec{a} = 5.29\,N$

$\vec{a} = \frac{5.29\,\cancel{kg}\,m/s^2}{4.7\,\cancel{kg}}$

$\vec{a} = 1.1\,m/s^2$ [$\rightarrow$] object

[$\downarrow$] mass

$\vec{F}_T = (3.2\,kg)(1.12\,\frac{m}{s^2}) + 9.41\,N$

$\vec{F}_T = 3.6\,N + 9.41\,N$

$\vec{F}_T = 13\,N$ [$\rightarrow$]

[$\uparrow$]

c) $v_i = 1.3\,m/s$ [$\rightarrow$]

$a = 1.1\,m/s^2$ [$\rightarrow$]

$\Delta t = 1.2\,s$

$\Delta d = v_i \Delta t + \frac{1}{2} a \Delta t^2$

$= (1.3)(1.2) + \frac{1}{2}(1.1)(1.2)^2$

$\Delta d = 2.4\,m$

Questions

- Pg. 177 #1,2,4
- Pg. 178 #2-5