May 2, 2018

1) answers #1c-10 Forces WS

2) guided practice objects against wall

3) Practice Questions

Reminder Test on Forces on Wednesday!!

1.

c) $F_f = \mu F_n$

$\frac{(-125)}{245} = \frac{\mu(245)}{245}$

$-0.51 = \mu$

2. F_N, F_f, F_a, F_g

a) mass = ?

weight $= F_g = 75\,N$

$g = 9.81\ m/s^2$

$F_g = mg$

$\frac{75}{9.81} = \frac{m(9.81)}{9.81}$

$7.65 = m$

$7.7\,kg = m$

b) F_f = ?

$F_{net} = 15\,N$

$\mu = 0.19$

$F_N = 75\,N$

$F_f = \mu F_N$

$F_f = (0.19)(75)$

$F_f = 14.25\,N$

c) F_a = ?

$F_{net} = \sum Forces$

$F_{net} = F_a + F_f$

$15 = F_a + (-14.25)$

$29.25\,N = F_a$

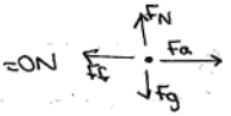
3. $m = 55kg$, $F_{net} = 28N$, $F_a = 185N$

a) $F_f = ?$ $F_{net} = \sum Forces$, $F_{net} = F_f + F_a$, $28 = F_f + 185 - 185$, $-157 = F_f$

b) $F_N = mg$, $F_N = (55)(9.81)$, $F_N = 540N$

c) $\mu = ?$ $F_f = \mu F_N$, $\frac{-157}{540} = \frac{\mu 540}{540}$, $\mu = 0.29$

4. constant velocity $F_{Net} = 0N$



$F_a = 184N$

$\mu = 0.26$

a) $F_{Net} = \sum Forces$, $F_{Net} = F_a + F_f$, $0 = 184 + F_f - 184$, $-184 N = F_f$

b) $F_g = ?$ normal force is equal in magnitude by opposite direction of F_g so use $F_f = \mu F_N$, $\frac{(-184)}{0.26} = \frac{(0.26)F_N}{0.26}$, $-708N = F_N$, $\therefore F_g = 708 N$

c) mass = ? $F_g = mg$, $\frac{708}{9.81} = \frac{m(9.81)}{9.81}$, $72.2kg = m$

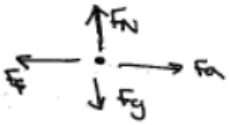
5. $m = 46kg$, $F_a = 200N$, $\mu = 0.18$

a) $F_g = ?$ $F_g = mg$, $F_g = (46)(9.81)$, $F_g = 451 N$

b) $F_f = ?$ $F_f = \mu F_N$, $F_f = (0.18)(451)$, $F_f = 81N$

c) $F_{net} = \sum Forces$, F_f = opposite direction so (-), $F_{net} = F_f + F_a$, $= (-81) + 200$, $F_{net} = 119 N$

6. constant velocity $F_{Net} = 0N$



$F_a = 250N$

$\mu = 0.16$

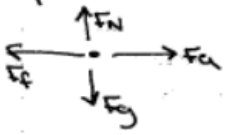
mass = ?

$F_{net} = \sum Forces$, $F_{net} = F_a + F_f$, $0 = 250 + F_f$, $-250 = F_f$

$F_f = \mu F_N$, $\frac{-250}{0.16} = \frac{0.16 F_N}{0.16}$, $1563 = F_N$

$F_N = mg$, $\frac{1563}{9.81} = \frac{m(9.81)}{9.81}$, $159kg = m$

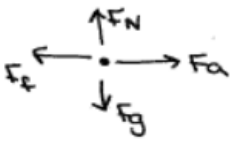
7. $m = 37\,kg$
constant velocity $F_{Net} = 0N$
$F_a = 145\,N$ $\therefore$ ① $F_f = -145$
$\mu = ?$



② $F_N = mg$
$F_N = (37)(9.81)$
$F_N = 363$

③ $F_f = \mu F_N$
$\frac{(-145)}{(-363)} = \frac{\mu(-363)}{(-363)}$
$0.40 = \mu$

8. $m = 39\,kg$
$F_a = 133\,N$
$\mu = 0.25$
$F_{Net} = ?$

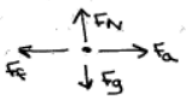


① $F_N = mg$
$F_N = (39)(9.81)$
$F_N = 383\,N$

② $F_f = \mu F_N$
$F_f = (0.25)(383)$
$F_f = -96\,N$

③ $F_{Net} = \Sigma Forces$
$F_{Net} = F_f + F_a$
$F_{Net} = (96) + (133)$
$F_{Net} = 37\,N$

9. $m = 42\,kg$
$F_{Net} = 52\,N$
$F_a = 210\,N$
$\mu = ?$



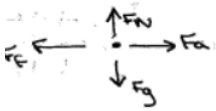
$F_f = \mu F_N$
need to find F_f and F_N

① $F_{Net} = \Sigma Forces$
$F_{Net} = F_a + F_f$
$52 = 210 + F_f$ -210
$-158 = F_f$

② $F_g = F_N$
$F_N = mg$
$F_N = (42)(9.81)$
$F_N = 412\,N$

③ $F_f = \mu F_N$
$\frac{(+158)}{412} = \frac{\mu(412)}{412}$
$0.38 = \mu$

10. weight $\therefore F_g = 166\,N$
$F_{Net} = 27\,N$
$\mu = 0.24$
$F_a = ?$

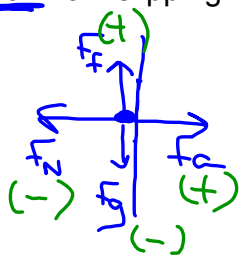


① $F_g = F_N$
$F_N = 166N$

② $F_f = \mu F_N$
$F_f = (0.24)(166)$
$F_f = 39.84$

③ $F_{net} = F_f + F_a$
$27 + 39.84 = -39.84 + F_a$ $+ 39.84$
$F_a = 67N$

A 3.4 kg book is pressed against the wall. The coefficient of static friction between wall and book is 0.23. Calculate the minimum applied force needed to keep the book from slipping down.



$m = 3.4\,kg$
$\mu = 0.23$
$F_{net} = 0$
$f_a = ?$

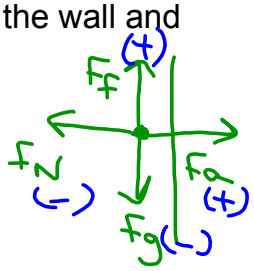
$|F_f| = |F_g|$
$|F_N| = |F_a|$

$f_g = mg$
$f_g = (3.4)(9.81)$
$|F_g| = 33N$

$|F_f| = \mu|F_N|$
$mg = \mu|F_N|$

$|F_f| = \mu|F_N|$
$\frac{33}{0.23} = \frac{0.23|F_N|}{0.23}$
$143N = |F_N| \therefore F_a = 143N$

A 4.2 kg book is pressed up against the wall using an applied force of 75 N. For the book not to fall, calculate the minimum coefficient of static friction necessary between the wall and the book.



$m = 4.2\,kg$
$F_a = 75N$
$\mu = ?$
$F_{net} = 0$

$|F_f| = |f_g|$
$|F_N| = |f_a|$

$|f_f| = \mu|F_N|$
$|F_g| = \mu|F_a|$
$mg = \mu|F_a|$
$(4.2)(9.81) = \mu 75$
$\frac{41}{75} = \frac{\mu 75}{75}$
$0.55 = \mu$

Forces Practice #11-13
(omit 14 there is a problem
with the question)