November 21, 2017

1. Inertia is the tendancy of objects to resist any change in motion. An objects inertia increases with mass therefore the softball having a greater mass than the ping pong ball will hurt your hand more when you try to stop its motion than the ping pong ball with the lighter weight.

2. Friction is caused by the interaction of two substances that come in direct contact with one another. Since the object is on the floor and you are attempting to move it there is friction between the object and the floor. As you apply force in an attempt to move the object eventually the applied force will be greater than the static force of friction and the box will start to move. While the box is in motion, the kinetic force of friction will continue to work against the applied force causing the object to stop moving. The coefficient of friction is the ratio of the force of friction between two objects.

3. F_g = weight = 129.6 N
$g_{moon} = 1.62 m/s^2$
m = ?

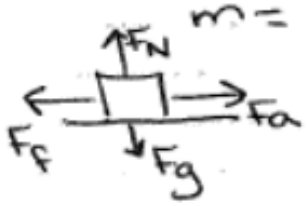
$F_g = mg$
$\frac{129.6N}{1.62} = \frac{m(1.62m/s^2)}{1.62}$
$80kg = m$

a) Earth $g = 9.81 m/s^2$
$F_g = mg$
$F_g = (80)(9.81)$
$F_g = 784.8N$

b) Mars $g = 3.72 m/s^2$
$F_g = mg$
$F_g = (80)(3.72)$
$F_g = 297.6N$

c) Jupiter $g = 25.9 m/s^2$
$F_g = mg$
$F_g = (80)(25.9)$
$F_g = 2072 N$

4. $F_a = 21.2N$
$\mu_s = 0.17$
m = ?



$|F_a| = |F_f|$

$F_F = \mu F_N$
$\frac{-21.2N}{0.17} = \frac{0.17 F_N}{0.17}$
$124.71 N = F_N$

$|F_g| = |F_N|$
$F_N = mg$
$\frac{124.71}{9.81} = \frac{m(9.81)}{9.81}$
$12.7kg = m$

5. constant speed $F_{net} = 0$
$F_a = 172.1\,N$

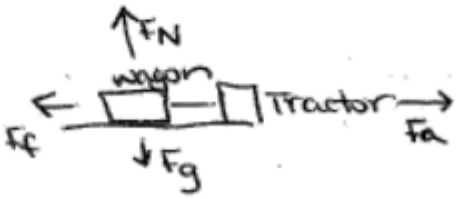
a) $m = 125.2\,kg$
$\mu = ?$

$|F_a| = |F_f|$
$|F_g| = |F_N|$
$F_N = mg$
$F_N = (125.2)(9.81)$
$F_N = 1228.2\,N$

$F_f = \mu F_N$
$\frac{172.1}{1228.2} = \frac{\mu 1228.2}{1228.2}$
$0.14 = \mu$

b) $\mu_s = 0.24$
$F_a = ?$
$F_N = 1228.2N$
$F_f = \mu F_N$
$F_f = (0.24)(1228.2)$
$F_f = 294.8N$
$|F_f| = |F_a|$

6. $m = 432.5\,kg$
$F_a = 1648.0N$
$\mu_k = 0.27$
$F_{net} = ?$

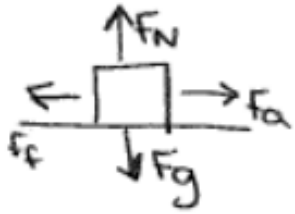


① $F_N = mg$
$F_N = (432.5)(9.81)$
$F_N = 4242.83N$

② $F_f = \mu F_N$
$F_f = (0.27)(4242.83N)$
$F_f = 1145.56N$

③ $F_{net} = F_a + F_f$
$= (1648.0) + (-1145.56)$
$F_{net} = 502.44N$

7. $m = 118\,kg$
constant velocity $F_{net} = 0$
$F_a = 615N$



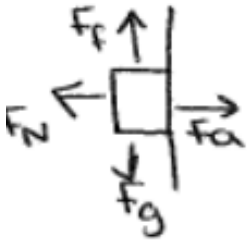
a) $F_{Net} = \Sigma Forces$
$F_{net} = F_a + F_f$
$0 = 615 + F_f$
$-615 = F_f$

b) $F_N = F_g$
$= mg$
$F_N = (118)(9.81)$
$F_N = 1158N$

c) $F_f = \mu F_N$
$\frac{615}{1158} = \frac{\mu(1158)}{1158}$
$0.53 = \mu$

8. $m = 32.5\,kg$
$F_a = 755N$
$\mu = ?$

$F_a = F_N$
$F_f = F_g$



$F_f = \mu F_N$
$F_g = \mu F_a$
$mg = \mu F_a$
$(32.59)(9.81) = \mu\,755$
$\frac{318.83}{755} = \frac{\mu\,755}{755}$
$0.42 = \mu$