Name: KEY

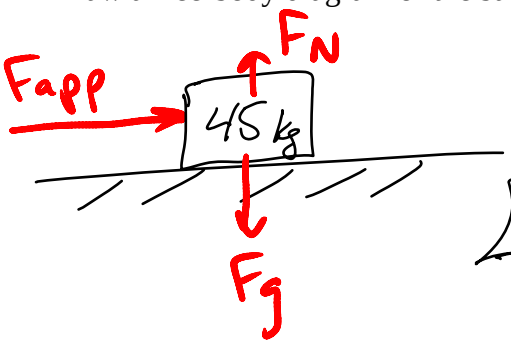
Date:

Section C D F

The Masters School
Mr. Alex Rawson
Physics
DOBBS

Forces I

1. What net external force is required to push a 45 kg suitcase with an acceleration of 3.5 m/s^2 to the right? Draw a free-body diagram of the suitcase.



$F_{net} = m \cdot a$

$F_{net} = 45 \cdot 3.5$

$F_{net} = 157.5\ N$

2. What acceleration will you give to a 60 kg box if you push it with a force of 147 N?

$F = m \cdot a$

$147 = 60 \cdot a$

$2.45\ m/s^2 = a$

3. An 1520 kg car is moving to the right at a constant velocity of 5.94 m/s.
   a. What is the net force on the car?

$F_{net} = 0$

   b. What would be the net force on the car if it were moving to the left?

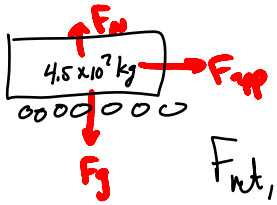
$F_{net} = 0$

4. A freight train has a mass of 4.5 ×10^7 kg. If the locomotive can exert a constant pull of 10.5 ×10^5 N, how long would it take to increase the speed of the train from rest to 85 km/h?

(Ignore Friction)

23.61 m/s

F_{app}



$F_{net,x} = F_{app} = 10.5 \times 10^5 N = m \cdot a$

$10.5 \times 10^5 N = 4.5 \times 10^7 kg \cdot a$

$.023\ m/s^2 = a$

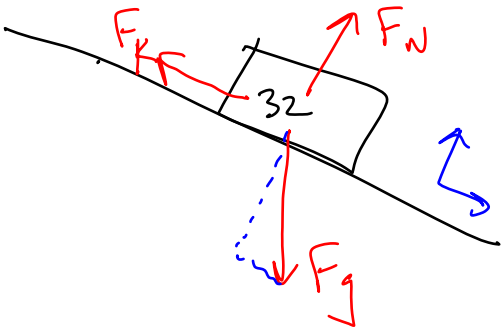
$V_f = V_i + a\,\Delta t$

$23.61\ m/s^2 = 0 + (.023)\Delta t$

$\Delta t = 1026.57$ seconds

$\Delta t = 17.1$ minutes

5. A 32 kg mass starts from rest and slides down an inclined plane 8.0×10^{-1} m long in 0.8 s. What net force is acting on the mass along the incline?



$\Delta x = .8$ m

$V_i = 0$

$V_f =$

$a = ?$

$\Delta t = .8$ s

$\Delta x = V_i \Delta t + \frac{1}{2} a \Delta t^2$

$.8 = \frac{1}{2} a (.8)^2$

$.8 = .32\, a$

$2.5 \text{ m/s}^2 = a$

$F_{net} = m \cdot a$

$= 32 \cdot 2.5$

$F_{net} = 80$ N

6. A 1350 kg car is pulling a 475 kg trailer. Together, the car and trailer have an acceleration of 2.15 m/s^2 directly forward.
   a. Determine the net force on the car.
   b. Determine the net force on the trailer.

$a = 2.15 \text{ m/s}^2$

$F_{net,trailer} = m \cdot a$

$F_{net,trailer} = 475 (2.15)$

$F_{net,trailer} = 1021.25$ N

$F_{net,car} = m \cdot a$

$F_{net,car} = 1350 (2.15)$

$F_{net,car} = 2,902.5$ N