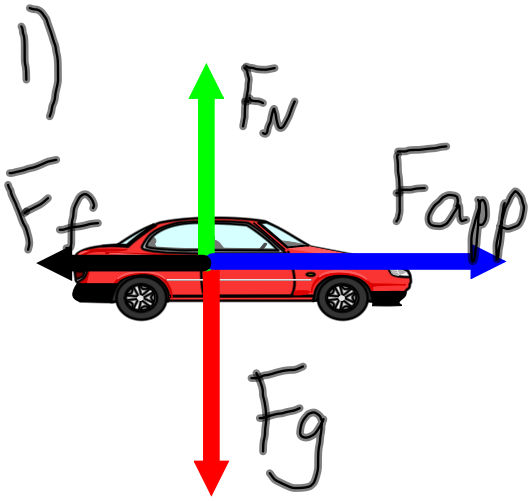
1)



$F_{net} = ma$ → 2

we don't know a... so that means Kinematics!!!

$V = 60.0\ km/h \div 3.6 = 16.67\ m/s$

$V_0 = 0\ m/s$

$a = ?$

$d = 45\ m$

$t =$

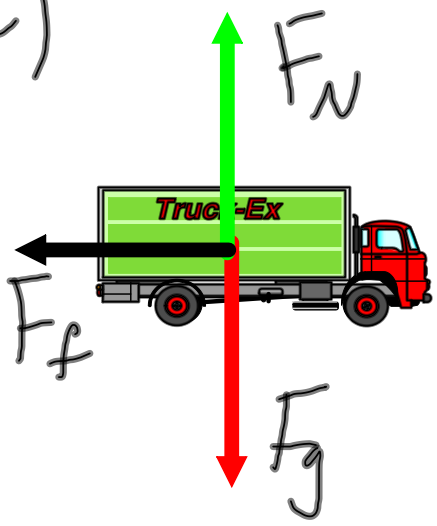
$V^2 = V_0^2 + 2ad$ ($V_0 = 0$)

$a = \frac{V^2}{2d} = 3.0865\ m/s^2$

$F_{net} = ma = (1100\ kg)(3.0865\ m/s^2)$

$= 3400\ N$

2)



Remember, while the car is rolling there is no Fapp therefore the net force = Ff

$$F_{net} = ma$$

$$F_f = ma$$

But first kinematics...

$V = 0\ m/s$

$V_0 = 24\ m/s$

$a = ?$

$d = 225\ m$

t

$$\cancel{V^2} = V_0^2 + 2ad$$

$$a = \frac{-V_0^2}{2d}$$

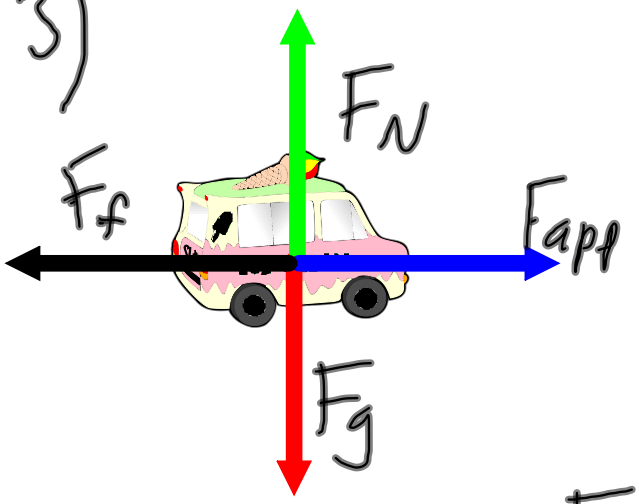
$$= -1.28\ m/s^2$$

Remember that we will use the "-" sign when doing kinematics but not in our force equations

$$F_f = ma = (1400kg)(1.28\ m/s^2)$$

$$= 1800\ N$$

3)

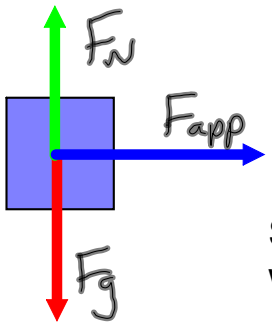


Since v = constant
a = o
therefore Fnet = O
so Fapp = Ff

$F_{app} = F_f = 350\,N$

Note the speed of the truck (35 m/s) does not matter, just that it is constant

4) a



$F_{net} = ma$

Since there is only Fapp which is winning and no opposing forces
Fnet = Fapp

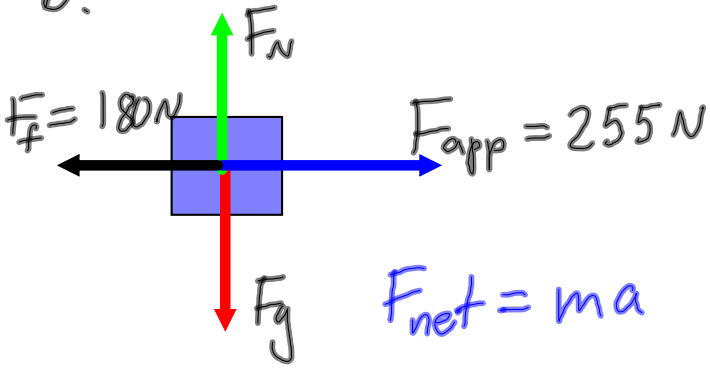
$F_{app} = ma$

$= (85\,kg)(3.0\,m/s^2)$

use extra sig figs later → $= 255\,N$

$= 260\,N$

b.



$F_{net} = ma$

$F_{net} = F_{app} - F_f$

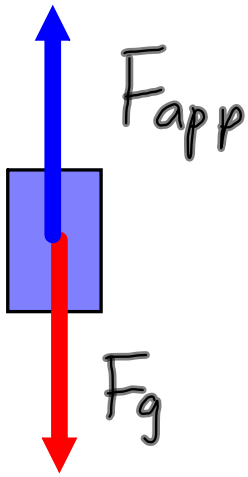
$= 255N - 180N$

$= 75\,N$

$a = \frac{F_{net}}{m} = \frac{75\,N}{85\,kg}$

$= 0.88\,m/s^2$

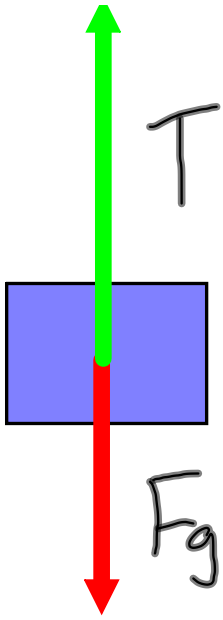
5)



since V = constant
a=o
therefore Fnet = o
therefore Fapp = Fg

$$F_{app} = F_g = mg$$
$$= (15\,kg)(9.80\,m/s^2)$$
$$= 150\,N$$

6)



$F_{net} = ma$

$T - F_g = ma$

winner

loser

$T = ma + F_g$

$F_g = mg$

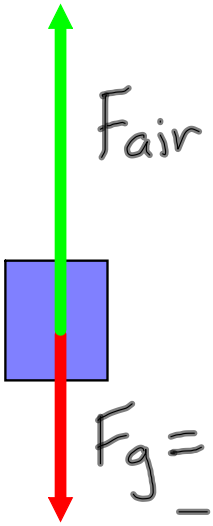
$= (4.0\,kg)(9.80\,m/s^2)$

$= 39.2\,N$

$T = (4.0\,kg)(3.2\,m/s^2) + 39.2\,N$

$= 52\,N$

7)



$F_g = mg = (75\,kg)(9.80\,m/s^2)$
$= 735\,N$

$F_{net} = ma$

$F_{air} - F_g = ma$

$F_{air} = ma + F_g$

Uh oh! No acceleration... you know what time it is!!!

$V = 25\,km/h \div 3.6 = 6.944\,m/s$
$V_0 = 220\,km/h \div 3.6 = 61.11\,m/s$
$a = ?$
$d =$
$t = 3.8\,s$

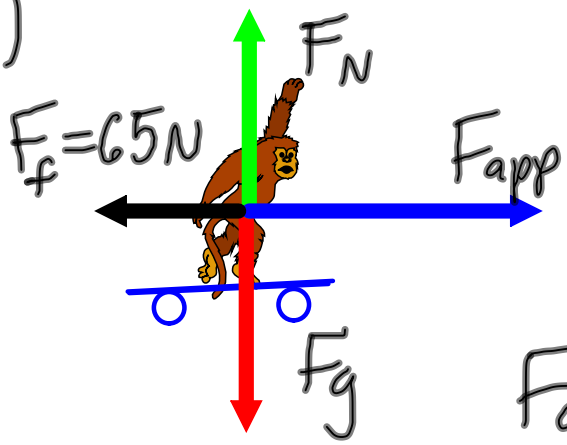
$V = V_0 + at$

$a = \frac{V - V_0}{t}$

$= -14.25\,m/s^2$

$F_{air} = ma + F_g$
$= (75\,kg)(14.25\,m/s^2) + 735\,N$
$= 1800\,N$

8)



$$F_{net} = ma$$

$$F_{app} - F_f = ma$$

winner — loser

$$F_{app} = ma + F_f$$

find this

$V = 13\ m/s$

$V_0 = 0\ m/s$

$a = ?$

$d = 8.0m$

$+$

$$V^2 = V_0^2 + 2ad$$

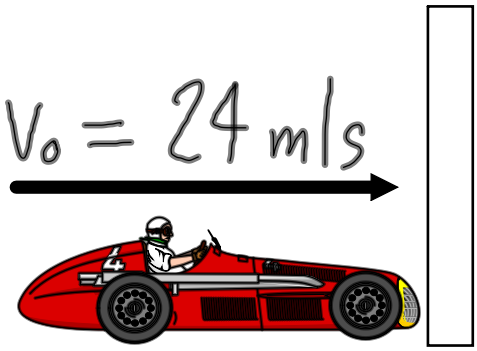
$$a = \frac{V^2}{2d} = 10.56\ m/s^2$$

$$F_{app} = ma + F_f$$

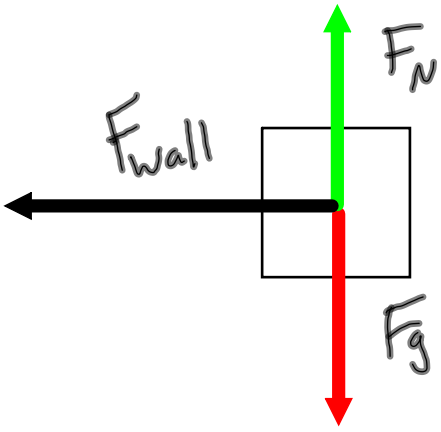
$$= (45\ kg)(10.56\ m/s^2) + 65\ N$$

$$= \underline{540\ N}$$

9) a.



Note that since the car bounces backwards its final velocity is negative!!!



$F_{net} = ma$

$F_{wall} = ma$

$V = -8.0 m/s$

$V_0 = 24.0 m/s$

$a = ?$

$d =$

$t = 0.90 s$

$V = V_0 + at$

$a = \frac{V - V_0}{t}$

$= \frac{(-8.0 m/s) - (24.0 m/s)}{0.90 s}$

$= 35.56\ m/s^2$

$F_{wall} = ma$

$= (1350 kg)(35.56\ m/s^2)$

$= 4.8 \times 10^4\ N$

9)b. $F_{wall} = ma$

$V = -8.0\ m/s$

$V_0 = 24.0\ m/s$

$a = ?$

$d =$

$t = 0.080\ s$

$V = V_0 + at$

$a = \frac{V - V_0}{t}$

$= \frac{(-8.0\ m/s) - (24.0\ m/s)}{0.080\ s}$

$= -400\ m/s^2$

$F_{wall} = ma$

$= (1350\ kg)(400\ m/s^2)$

$= 5.4 \times 10^5\ N$