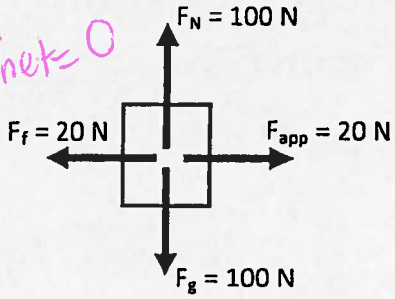
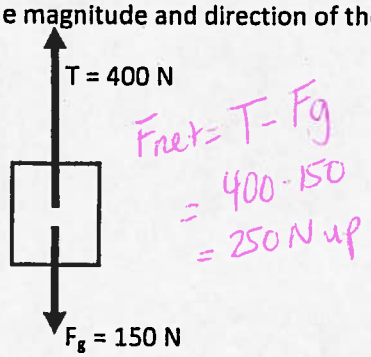
Worksheet 4.1

Newton's 2nd Law

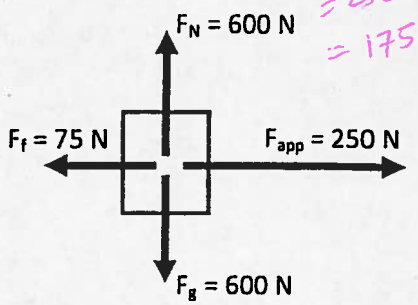
1) For each of the following diagrams determine the magnitude and direction of the net force.



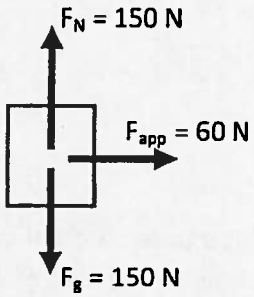
Fnet = 0



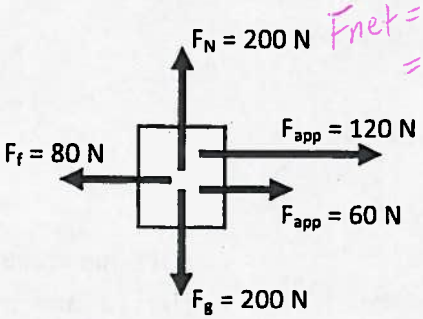
Fnet = T - Fg
= 400 - 150
= 250 N up



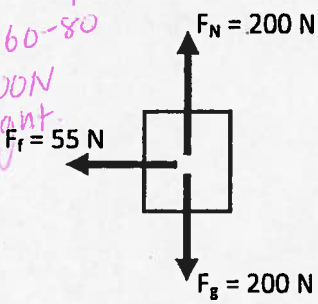
Fnet = Fapp - Ff
= 250 - 75
= 175 N right



Fnet = Fapp
= 60 N right



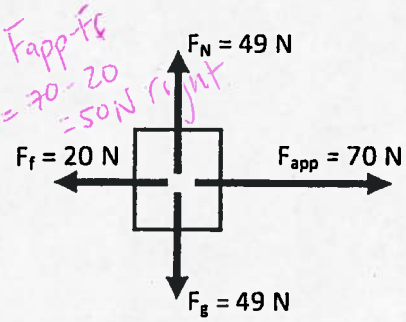
Fnet = Fapp1 + Fapp2 - Ff
= 120 + 60 - 80
= 100 N right



Fnet = Ff
= 55 N left

Fnet =

2) Use the information given for each diagram to fill in all missing blanks.

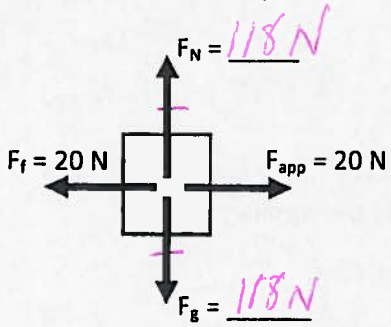


Fnet = Fapp - Ff
= 70 - 20
= 50 N right

m = 5 kg

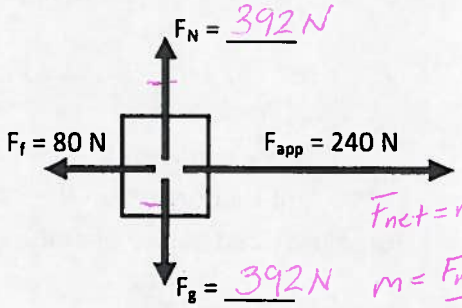
a = 10 m/s² right

F = ma
= 5(10)
= 50 N



m = 12 kg

a = 0 m/s²



Fnet = Fapp - Ff = 240 - 80
= 160 N

Fnet = ma

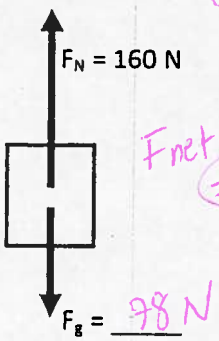
m = Fnet / a

m = 160 / 4

m = 40

m = 40 kg

a = 4 m/s² right

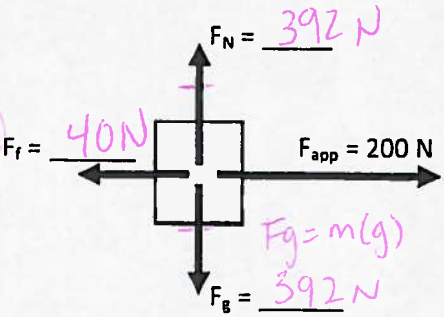


Fnet = 160 - 78
= 82 N

m = 8 kg

a = 10 m/s²

Fg = ma
= 8(9.8)

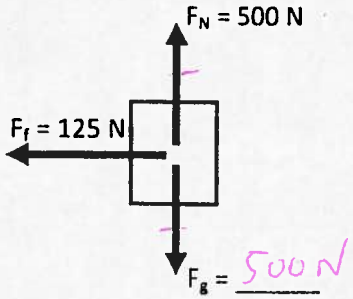


Fg = m(g)

m = 40 kg

a = 4 m/s² right

Fnet = ma
= 40(4) = 160

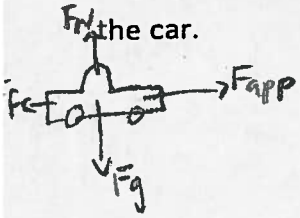


m = 51 kg

a = 2.45 m/s²

Worksheet 4.2: Newton's Second Law Worksheet #2

1) A 1100 kg car accelerates from rest to 60.0 km/h over a distance of 45 m. Find the net force acting on the car.



$F_{net} = ma$

$V_f = 16.7 m/s$
$V_i = 0$
$d = 45 m$
$a = ?$
$t = x$

$V_f^2 = V_i^2 + 2ad$

$279 = 2(a)45$

$3.1 m/s^2 = a$

60 km/hr = 16.7 m/s

$F = ma = 1100(31)$
$= 3400 N$

2) A 1400 kg car is traveling at 24 m/s when the driver takes his foot off of the gas. The car eventually rolls to a stop after 225 m. Find the force of friction acting on the car.

$V_f = 0$
$V_i = 24 m/s$
$d = 225 m$
$a = ?$
$t = x$

$V_f^2 = V_i^2 + 2ad$

$0 = 576 + 2(a)(225)$

$-576 = 2a(225)$

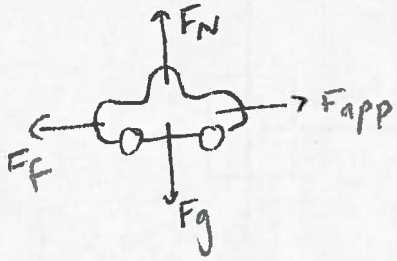
$a = -1.28 m/s^2$

$F = ma$
$= 1400(1.28)$
$= 1792 N$

3) A 950 kg car travels at a constant speed of 35 m/s. If 350 N of friction act on the car, what is the applied force provided by the engine?

$v = constant$
$F_{net} = 0$
$F_{app} = F_f$

$F_{app} = 350N$



4) Ernie pushes Bert on a toboggan across some frictionless snow. Bert and the toboggan have a total mass of 85 kg and they are accelerating at 3.0 m/s^2.

a. Find Ernie's applied force (F_{Ernie})

Since there is only Fapp

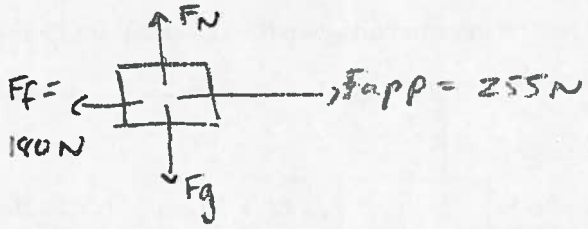
$F_{net} = F_{app}$

$F_{app} = ma$

$= 85(3.0)$

$= 255 N$

b. If Ernie and Bert hit a bare patch of concrete that exerts a force of friction on the sled of 180 N, what will their acceleration be in this time?



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

$= 255 - 180 N$

$= 75 N$

$F_{net} = ma$

$75 = 85(a)$

$a = 0.88 m/s^2$