1.) Ex. A 15kg object is accelerating to the left at 4 m/s^2.
There is a friction coefficient of 0.15. Analyze all the forces on the object.

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

$F_{net} + F_{fr} = F_{app}$

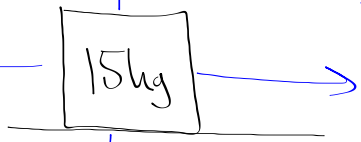
$60 + 22.05 = F_{app}$

$F_{app} = 82.05\,N$

$F_{net} = m \cdot a$

$= (15kg)(4\,m/s^2)$

$F_{net} = 60\,N$



F_{app}

$F_n = 147\,N$

$F_{fr} = F_n \cdot \mu$

$= (147\,N)(0.15)$

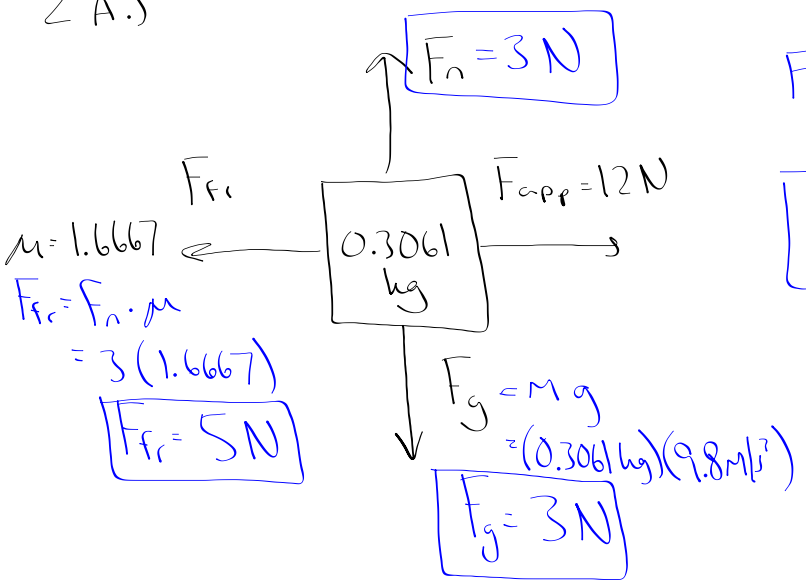
$F_{fr} = 22.05\,N$

$F_g = m \cdot g$

$= (15kg)(9.8\,m/s^2)$

$F_g = 147\,N$

2 A.)

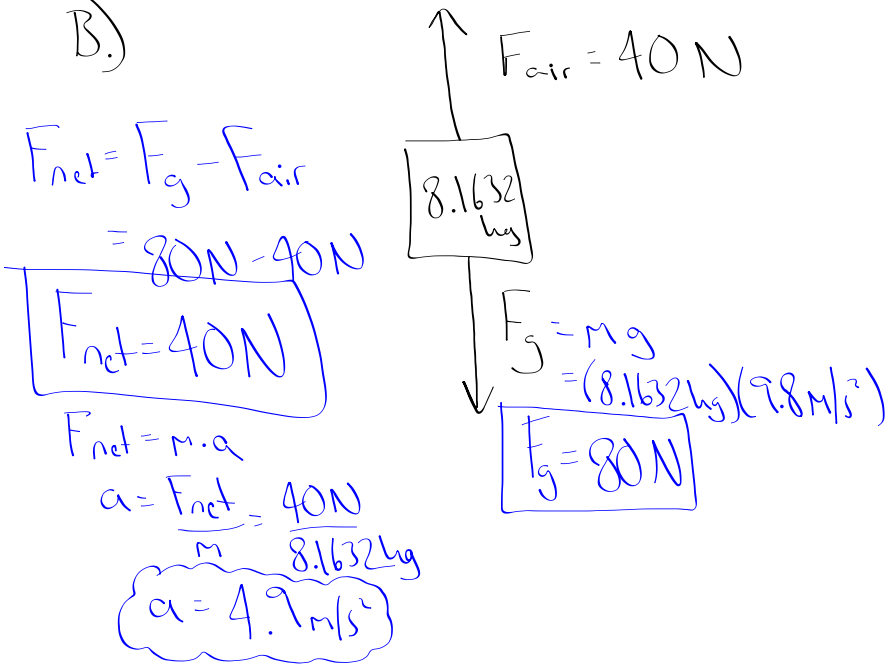


$F_{fr} = F_n \cdot \mu$
$= 3(1.6667)$
$F_{fr} = 5N$

$F_{net} = F_{app} - F_{fr}$
$= 12N - 5N$
$F_{net} = 7N$

$F_{net} = m \cdot a$
$a = \frac{F_{net}}{m} = \frac{7N}{0.3061kg}$
$a = 22.9 m/s^2$

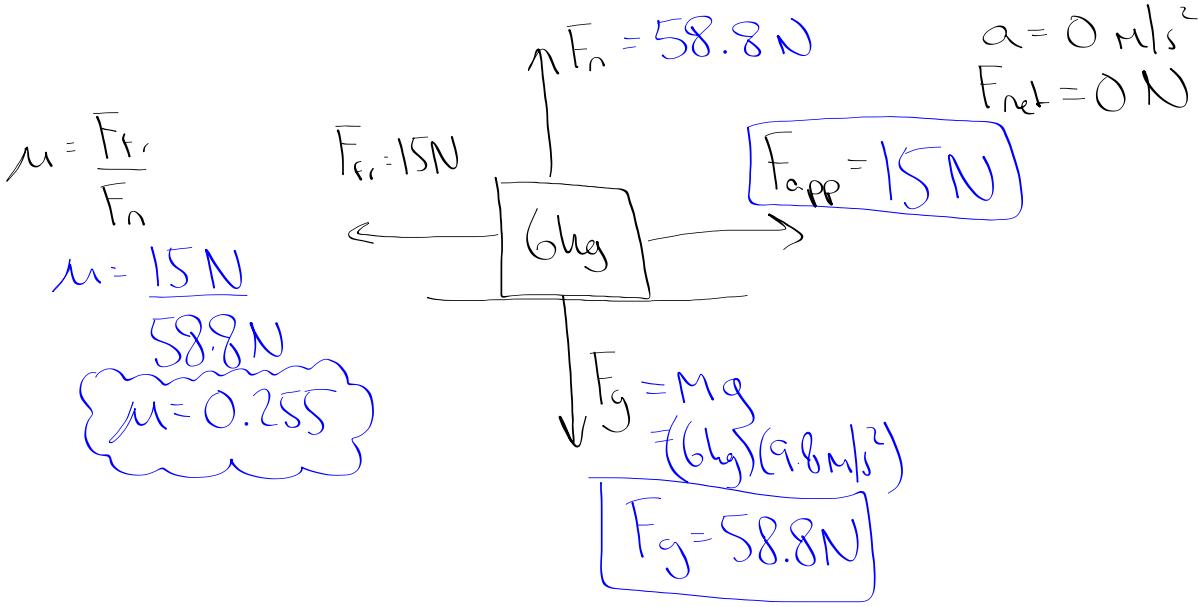
B.)



$F_{net} = F_g - F_{air}$
$= 80N - 40N$
$F_{net} = 40N$

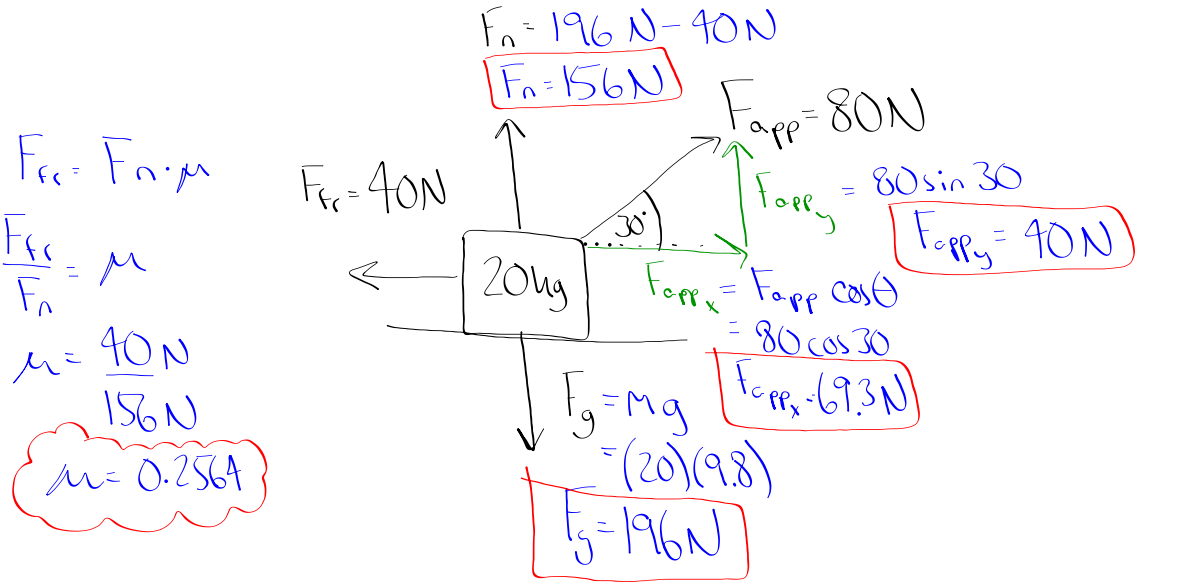
$F_{net} = m \cdot a$
$a = \frac{F_{net}}{m} = \frac{40N}{8.1632kg}$
$a = 4.9 m/s^2$

2) A rightward force is applied to a 6kg object to move it across a surface at constant velocity. The object encounters 15N of friction. Analyze all properties on the object.



Forces At An Angle

Ex. Analyze all the properties on this Free-body diagram



$F_{fr} = F_n \cdot \mu$

$\frac{F_{fr}}{F_n} = \mu$

$\mu = \frac{40\,N}{156\,N}$

$\mu = 0.2564$

$F_{net} = F_{app_x} - F_{fr}$

$= 69.3 - 40$

$F_{net} = 29.3\,N$

$F_{net} = m \cdot a$

$a = \frac{F_{net}}{m} = \frac{29.3\,N}{20kg}$

$a = 1.465\,m/s^2$

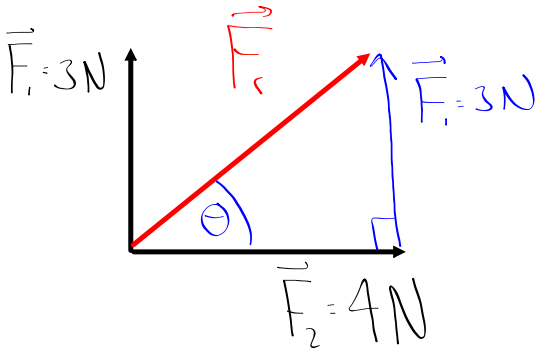
Forces & Vectors

Recall:

$$\vec{F}_r = \sqrt{\vec{F}_1^{\,2} + \vec{F}_2^{\,2}}$$

$$\vec{F}_r = \sqrt{9+16}$$

$$\vec{F}_r = 5N$$

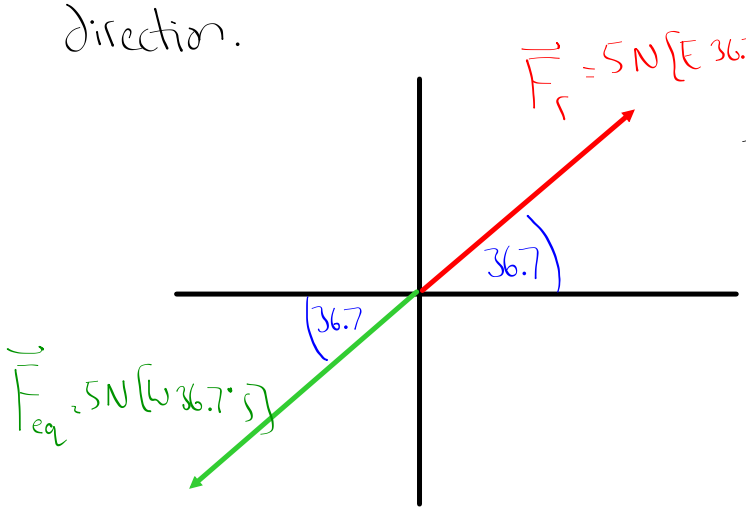


$$\theta = \tan^{-1}\left(\frac{3}{4}\right)$$

$$\theta = 36.7°$$

$$\vec{F}_r = 5N\,[E\,36.7°\,N]$$

If you want to balance out a resultant vector we would need a force of 5N in the opposite direction.



The balancing force is known as the EQUILIBRANT FORCE (F_{eq})

Ex. Analyze the properties!