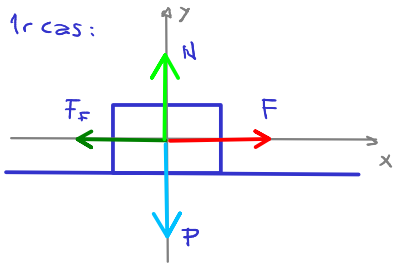
1r cas:



$m = 100\,kg$

$\mu = 0{,}4$

Equacions de Newton:

eix x: $F - F_F = ma_x$

eix y: $N - P = ma_y$ però $a_y = 0$ (no hi ha moviment vertical)

Equacions constitutives: $F_F = \mu N$ (fricció)

$P = mg$

Aleshores: $F - \mu N = ma$

$N - mg = 0 \Rightarrow N = mg$

Si reemplacem $N = mg$ a la primera obtenim:

$F - \mu mg = ma$

$$a = \frac{F - \mu mg}{m} = \frac{700 - 0{,}4 \cdot 100 \cdot 9{,}81}{100} = \boxed{3{,}08\ m/s^2}$$

2n cas:

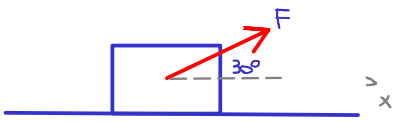
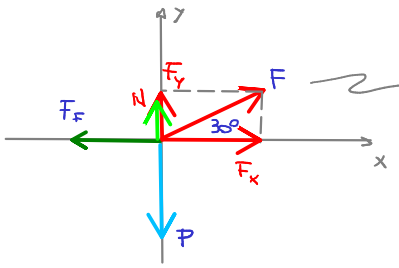
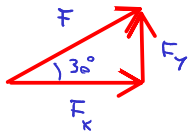


Diagrama de forces:





$F_x = F\cos 30°$

$F_y = F\sin 30°$

Equacions de Newton:

eix x: $F_x - F_F = ma$ amb $F_F = \mu N \Rightarrow F_x - \mu N = ma \Rightarrow F\cos 30° - \mu N = ma$ (I)

eix y: $F_y + N - P = 0 \Rightarrow N = P - F_y \Rightarrow N = mg - F_y \Rightarrow N = mg - F\sin 30°$ (II)

Reemplaçant (II) en (I):

$F\cos 30° - \mu(mg - F\sin 30°) = ma$

$$a = \frac{F\cos 30° - \mu(mg - F\sin 30°)}{m} = \frac{700 \cdot \cos 30° - 0{,}4\,(100 \cdot 9{,}81 - 700\sin 30°)}{100} = \boxed{3{,}53\ m/s^2}$$

3r cas:

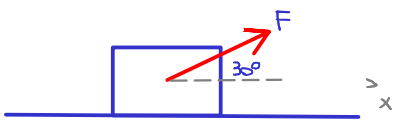
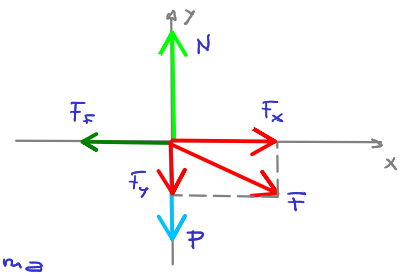


Diagrama de forces:



Equacions de Newton:

$F_x - F_F = ma \Rightarrow F\cdot\cos 30° - \mu N = ma$

$N - P - F_y = 0 \Rightarrow N = P + F\sin 30°$

$$ma = F\cos 30^\circ - \mu(P + F\sin 30^\circ)$$

$$a = \frac{F\cos 30^\circ - \mu(mg + F\sin 30^\circ)}{m} = \frac{700\cdot\cos 30^\circ - 0{,}4(100\cdot 9{,}81 + 700\sin 30^\circ)}{100} = \boxed{0{,}74\ m/s^2}$$

Podem constatar que l'acceleració serà menor quan la força F s'aplica contra el terra, ja que en aquest cas la força de fregament serà menor: