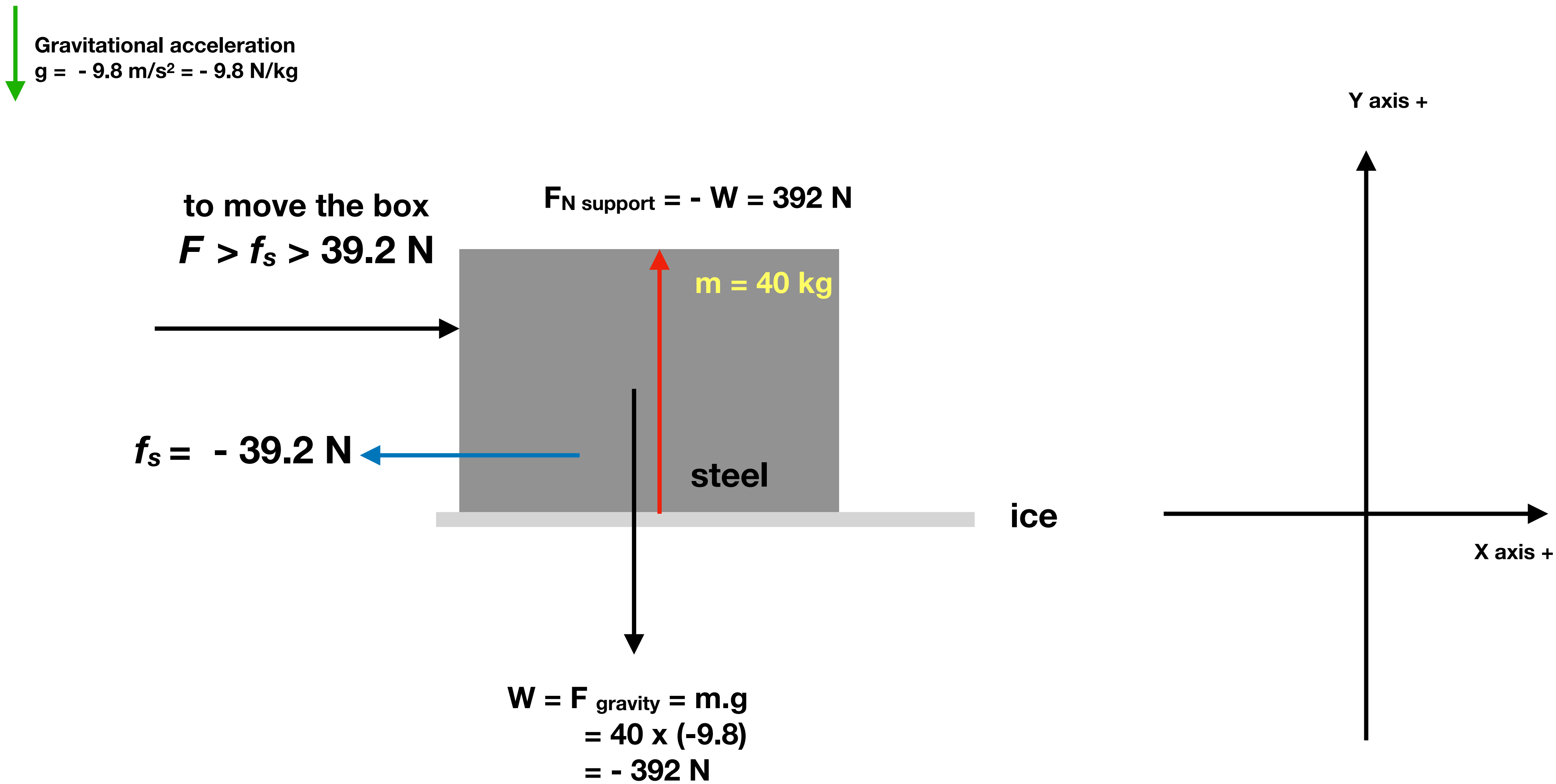
The forces along the Y axis (vertical direction) are: W = $F_{gravity}$ and $F_{N\ support}$

The forces along the x axis (horizontal direction) are: fs and applied F



static = no motion = rest

static frictional Force (f_s)

f_s = (surface of contact) F_N

f_s = (coefficient of static friction) F_N

$f_s = \mu_s F_N$

$f_s = \mu_s\, m.g$

(steel on steel)

$$f_s = \mu_s \; F_N$$

$$f_s = \mu_s \; m.g$$

$$f_s = 0.78 \times 40 \times -9.8$$

$$f_s = -305 \text{ N}$$

To push this box, I need to push with a force that is more than 305N (steel on ice) not in motion

$$f_s = \mu_s F_N$$

$$f_s = \mu_s m.g$$

$$f_s = 0.1 \times 40 \times -9.8$$

$$= 0.1 \times -392$$

$$= -39.2 \text{ N}$$

(steel on ice)

box is sliding = motion = kinetic

Kinetic Frictional Force (f_k)

$$f_k = \text{(coefficient of kinetic friction)}\ F_N$$

$$f_k = \mu_k\ F_N$$

$$f_k = \mu_k\ m.g$$

$$f_k = 0.05 \times 40 \times -9.8$$

$$= 0.05 \times -392$$

$$= -19.6 \text{ Newton}$$

The coefficient of sliding (kinetic) friction between two materials is 0.35. A 5.0 kg object made of one material is being pulled along a table make of another material. What is the kinetic force of friction?

$$f_k = \text{(coefficient of kinetic friction)} \; F_N$$

$$f_k = \mu_k \; F_N$$

$$f_k = \mu_k \; m.g$$

$$f_k = 0.35 \text{ x } 5 \text{ x } -9.8 = -17.1 \text{ Newton}$$

The driver of a 1500 kg car applies the brakes on a concrete road. Calculate the force of friction (a) on a dry road and (b) on a wet road.

Moving or at standing?

Moving: Kinetic frictional foce.

$$f_k = \text{(coefficient of kinetic friction)} \; F_N$$

$$f_k = \mu_k \; F_N$$

$$f_k = \mu_k \; m.g$$

$$f_k =$$

A 70 kg hockey player glides across the ice on steel stakes. What is the force of friction acting on the skater?   Answer 34.3 N

Moving = Kinetic

$$f_k = \text{(coefficient of kinetic friction)} \; F_N$$

$$f_k = \mu_k \; F_N$$

$$f_k = \mu_k \; m.g$$

$$f_k = 0.05 \times 70 \times 9.8 = 34.3 \text{ N}$$

The driver of a 1500 kg car applies the brakes on a concrete road. Calculate the force of friction (a) on a dry road and (b) on a wet road. Answer (a) 11760 N, **(b) 7350 N**

a) Moving = Kinetic Rubber on dry concrete

$$f_k = \mu_k \cdot m \cdot g$$

$$f_k = 0.8 \times 1500 \times 9.8 = 11760 \text{ Newton}$$

b) wet road.

$$f_k = \mu_k \cdot m \cdot g$$

$$f_k = 0.5 \times 1500 \times 9.8 = 7350 \text{ Newton}$$

To move an object, you need to pull with a force that is greater than the maximum static frictional force ($F > f_s^{MAX}$).

The force needed to move the girl:

$F > fs$

$F > 80.95$ N

$F = 80.95$ N can I pull? No