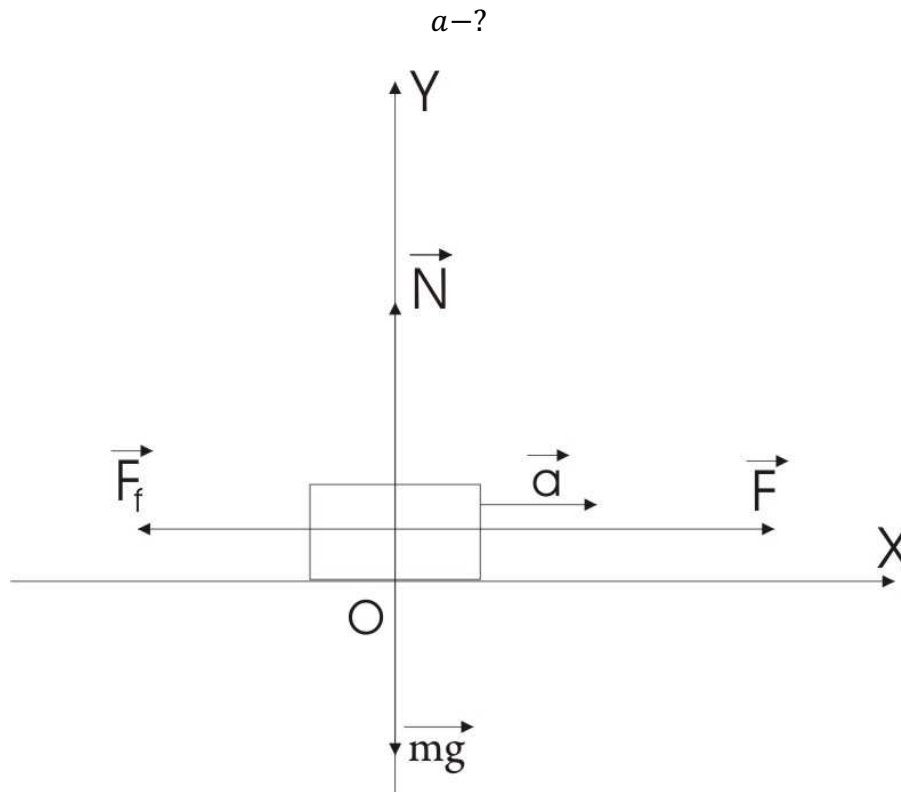


A 224 kg crate is pushed horizontally with a force of 710N. If the coefficient of friction is .25, calculate the acceleration of the crate.

Solution.

$$m = 224\text{kg}, F = 710\text{N}, \mu = 0.25, g = 9.8 \frac{\text{m}}{\text{s}^2};$$



Newton's second law in vector form:

$$m\vec{a} = \vec{F} + \vec{F}_f + \vec{N} + m\vec{g};$$

Projection on OX:

$$ma_x = F_x - F_{fx} + 0 + 0 = F - F_f;$$

Projection on OY:

$$ma_y = 0 + 0 + N_y - mg_y = N - mg;$$

$a_y = 0$ – a crate don't move on OY.

$$0 = N - mg;$$

$$N = mg;$$

$a_y = 0$; then $a_x = a$.

$$ma = F - F_f;$$

$$F_f = \mu N = \mu mg;$$

$F_f = \mu mg$ - force of friction.

$$ma = F - \mu mg;$$

$$a = \frac{F - \mu mg}{m} = \frac{F}{m} - \mu g;$$

$$a = \frac{F}{m} - \mu g.$$

$$a = \frac{710}{224} - 0.25 \cdot 9.8 \approx 0.72 \left(\frac{m}{s^2} \right).$$

Answer: $a = 0.72 \frac{m}{s^2}$.