

Answer on Question #45620 – Physics, Mechanics | Kinematics | Dynamics

Determine the appropriate coefficient of friction in each case. show all you solutions.

1. It takes 59 N of horizontal force to get a 22 kg leather suitcase just starting to move across a floor. find μ_s (hint $f_n = f_g = mg$)

2. A horizontal force of 54 N keeps the suitcase in moving at a constant velocity. find μ_k (hint $f_n = f_g = mg$)

By the definition of friction:

$$F = \mu N$$

Where μ – is a coefficient of friction, N – normal force.

From this equation we can find coefficient of friction:

$$\mu = \frac{F}{N}$$

On a horizontal plane, normal force will be equal to the weight of the body.

$$\mu = \frac{F}{mg}$$

1. In the first case we have static friction, so coefficient of static friction:

$$\mu_{st} = \frac{F_{st}}{mg}$$

$$\mu_{st} = \frac{59N}{22kg \cdot 9.8 \frac{m}{s^2}} \approx 0.27$$

2. When suitcase is moving with constant velocity, we will get kinetic friction:

$$\mu_k = \frac{F_k}{mg}$$

$$\mu_k = \frac{54N}{22kg \cdot 9.8 \frac{m}{s^2}} \approx 0.25$$

Answer: Coefficients of friction are:

static friction $\mu_{st} \approx 0.27$

kinetic friction $\mu_k \approx 0.25$