Question#19087

A 20 kg box is initially sliding across the floor at 10 m/s. If the force of friction on the box is 50 N, how far will the box slide before coming to a stop?

Solution:

Let:

$m = 20 \ kg$

$v_0 = 10 \ m/s$

$F = 50 \ N$

$S-?$

$S = v_0 t - \frac{1}{2}at^2, were \ t - time \ to \ a \ stop$

Such as $v = at, t = \frac{v}{a}$

$S = \frac{v_0^2}{a} - \frac{1}{2}\frac{v_0^2}{a} = \frac{1}{2}\frac{v_0^2}{a}$

According to the second Newton's law:

$a = \frac{F}{m}$

$S = \frac{1}{2}\frac{mv_0^2}{F}$

$S = \frac{1}{2}\frac{20*10^2}{50} = 2 \ m$

Answer: 2 m.