

QUESTION

10a.7 A 10.0-kg crate is moving to the right on the floor with a speed of 5.0 m/s. A pulling force a 120 N to the right is added to the crate. The coefficient of kinetic friction between the crate and the floor is 0.4. What is the speed of the crate after 3.0 m?

[Answer: 8.5 m/s]

Answer

$$v_f = 8.5 \text{ m/s}$$

Explanation

Given :

$$F = 120\text{N}$$

$$m = 10\text{kg}$$

$$d = 3 \text{ m}$$

Required :

Final speed, v_f

Solution:

First find the acceleration of the crate using $F = ma$;

$$120 = 10a$$

$$a = 120/10$$

$$a = 12 \text{ m/s}^2$$

Use the formula $v_f^2 = v_i^2 + 2ad$ to find the final speed v_f . At this point $v_i = 0$ or at rest since it come to stop ;

$$v_f^2 = v_i^2 + 2ad$$

$$= 0 + 2(12)(3)$$

$$= 72$$

$$v_f = \sqrt{72}$$

$$v_f = 8.5 \text{ m/s} , \text{ speed of the crate after 3m}$$