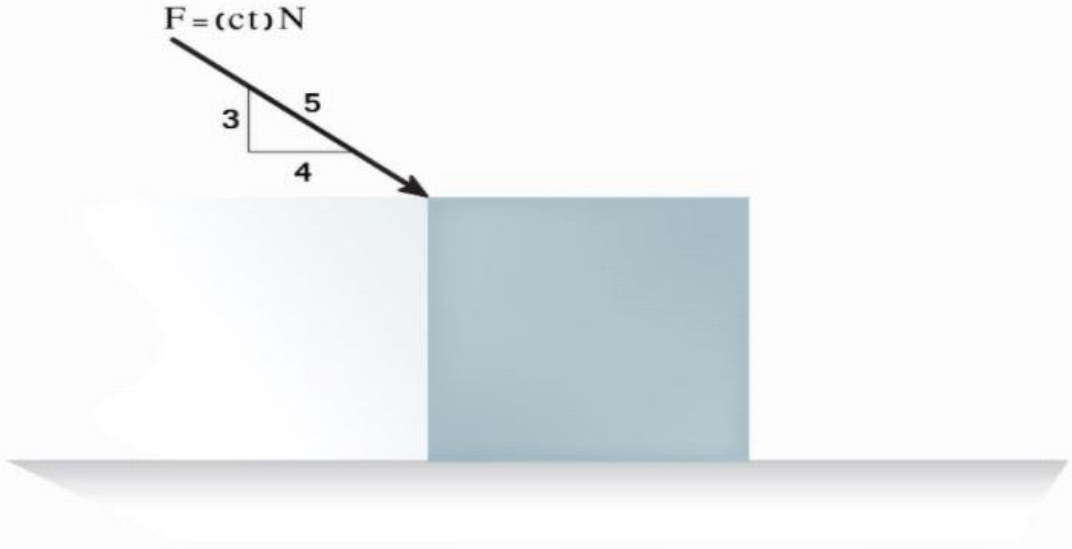
20-P-MOM-PT-003

September 10, 2020 4:25 PM

Determine the impulse of the force F, when c= 12.5 for time t= 2 s, and find the velocity of the box caused by the impulse. Assume the box is initially unmoving, has a mass of 3 kg, and no other forces act on it.



$F = (ct)\ N$

$I = \int F\, dt$

$= \int (ct)\, dt$

$= \int_0^2 12.5\, t\, dt$

$= \frac{12.5}{2} t \Big|_0^2 = 12.5\ N\cdot s$

The impulse is 12.5 N·s

v is in x direction

$m v_1 + \Sigma \int F \cdot dt = m v_2 \qquad v_1 = 0$

$4/5\ (12.5\ N\cdot s) = m v_2$

$v_2 = 4/5 \cdot \frac{12.5}{m} \qquad m = 3$

$v_2 = 3.33$ m/s

The velocity of the box is 3.33 m/s