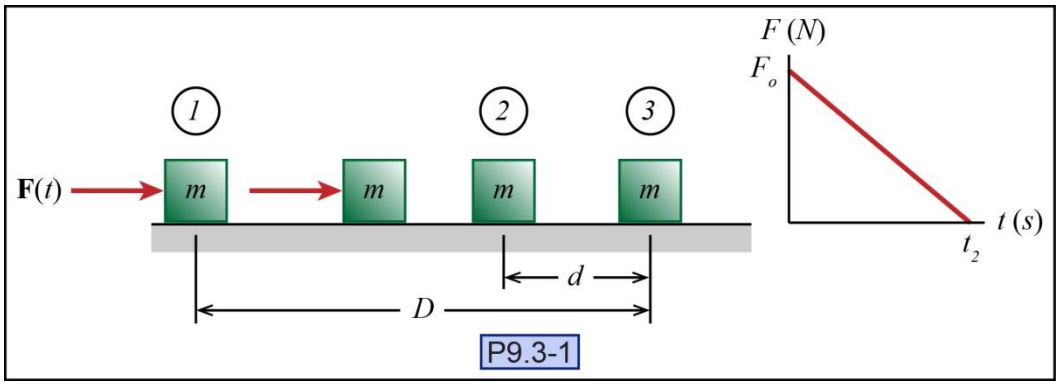
P9.3-1) A 2-kg box is initially at rest when it is pushed along a rough floor (μ_k = 0.4) by a force **F** whose magnitude as a function of time is given in the attached figure. If the force **F** is applied to the box at position *1* and is removed 3 seconds later at position *2*, determine the total distance, *D*, that the box travels before coming to rest at position 3. In the given force profile, you may take F_o to equal 30 N.



P9.3-1

Given:

Find:

Solution:

Draw a free-body diagram of the block.

Write down the force as a function of time.

$F(t)$ = _____

Determine the total horizontal linear impulse acting on the block between position 1 and 2 as a function of time.

$I(t)$ = _____

Using the principle of impulse and momentum, calculate the velocity between position 1 and 2 as a function of time.

$v(t)_{1\text{-}2}$ = _____

Use kinematics to calculate the distance between position 1 and 2.

$D - d$ = _____

Use the work-energy balance equation to calculate the distance between position 2 and 3.

d = _____

D = _____