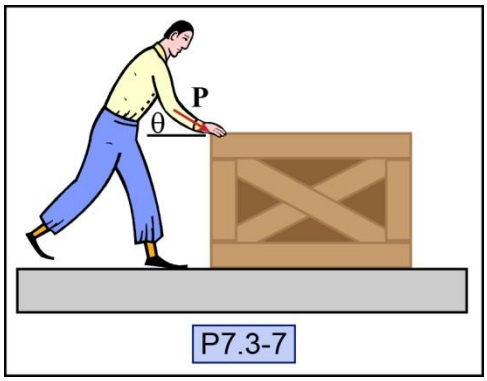
P7.3-7) A man pushes a 100-lb wood crate along a painted concrete floor. If he wishes to accelerate the crate to at least 3 mph starting from rest in a distance of 3 ft, what constant pushing force (**P**) is needed if it is applied at an angle of $\theta = 35^o$? The kinetic and static coefficients of friction are 0.2 and 0.28, respectively.



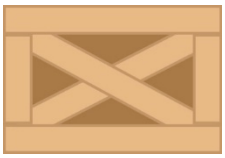
P7.3-7

Given:

Find:

Solution:

Free-body diagram



Is this a conservative or non-conservative system?

Which forces are

Conservative:

Non-conservative:

Do no work on the crate:

Friction

Derive the kinetic friction in variable form.

F_{fk} = _____

Work

Derive the work done by the non-conservative forces in variable form.

U_{non} = _____

Work-Energy Balance

Write down the work-energy balance equation in variable form.

WE.Eq: _____

Calculate the pushing force using the work-energy balance equation.

P = 42.6 lb