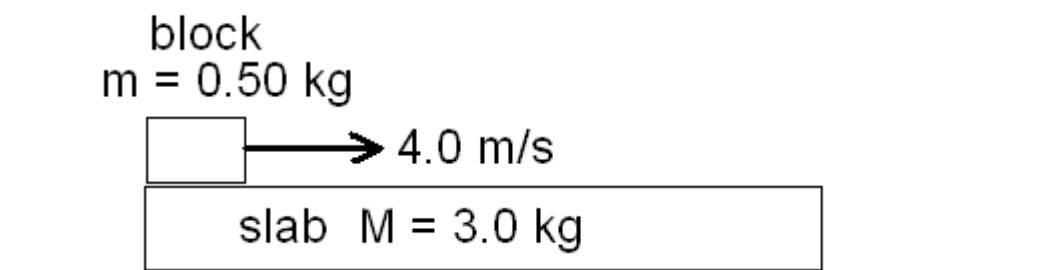


AP Physics C Test #1 Pretest Problem

Name _____

Period _____



A small block of mass $m = 0.50 \text{ kg}$ is placed on a long slab of mass $M = 3.0 \text{ kg}$ as shown above. Initially, the slab is at rest and the block has a speed of 4.0 m/s to the right. The coefficient of kinetic friction between the block and the slab is 0.20 , and there is no friction between the slab and the horizontal surface on which it moves.

- 1) On the figures below that represent the block and the slab, draw and label vectors to represent the forces acting on each as the block slides on the slab.

block

slab



- 2) At some moment later, before the block reaches the right end of the slab, both the block and the slab attain identical speeds v .

a) Calculate the value of v .

b) Calculate the distance the slab has traveled at the moment it reaches the speed v .

3) Suppose the slab is replaced with another slab for which the coefficient of friction is not constant. Instead, for the new slab/block combination the force of friction is found from the equation $F_f = 1.5t$. The block is placed on the new slab and given an initial velocity of 4.0 m/s to the right as before. At some moment later, before the block reaches the right end of the slab, both the block and the slab attain identical speeds v' .

a) Calculate the value of v' .

b) Calculate the distance the slab has traveled at the moment it reaches the speed v' .