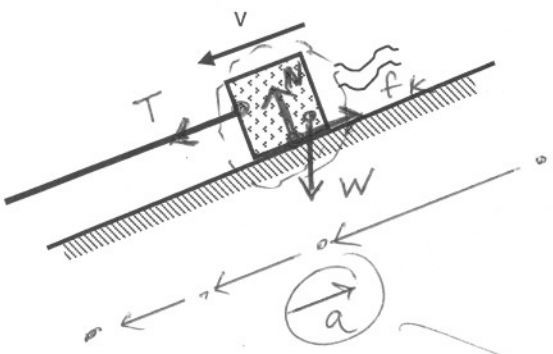
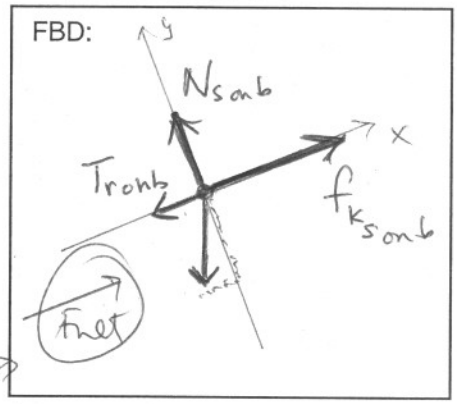
Physics 14 - Quiz #5 - Fall 2008[t]

SHOW ALL YOUR WORK AND REASONING

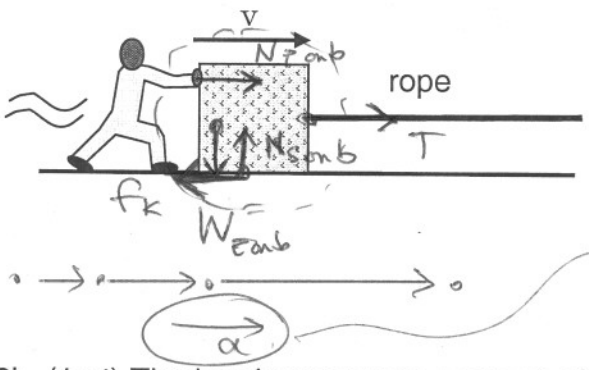
1. (4 pts) Draw a complete and accurate freebody diagram *for the box*, which is being dragged down a rough slope by a rope but with decreasing speed.



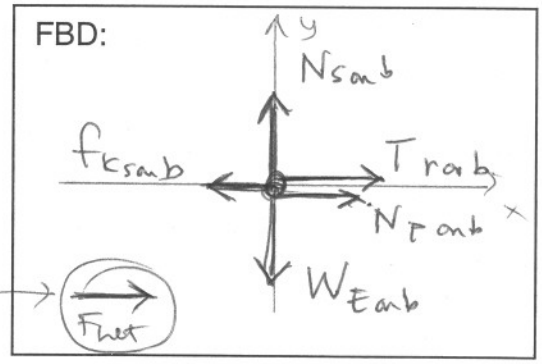
FBD:



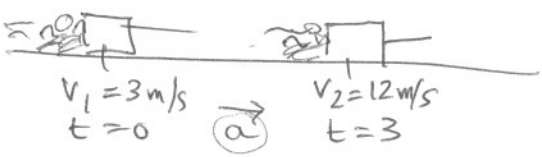
2a. (3 pts) Draw a free body diagram for the box (mass = 5 kg) below that is *increasing* its speed on a rough surface.



FBD:



2b. (1 pt) The box increases to a speed of 12 m/s from 3 m/s in a time of 3.0 seconds. What is the net force on the box?



$F_{net} = ma = (5)(3) = 15\ N$

$a = \frac{v_2 - v_1}{t} = \frac{12 - 3}{3} = 3\ m/s^2$

2c. (2 pts) How much tension is in the rope if the friction acting on the box is 40 N and the person's push has a magnitude of 25 N?

(Forces right) − (Forces left) = 15 N (= Fnet)

$(T + 25) - (40) = 15$

(N_{ponb}) ($friction$)

$(T + 25) = 55 \Rightarrow T = 30\ N$