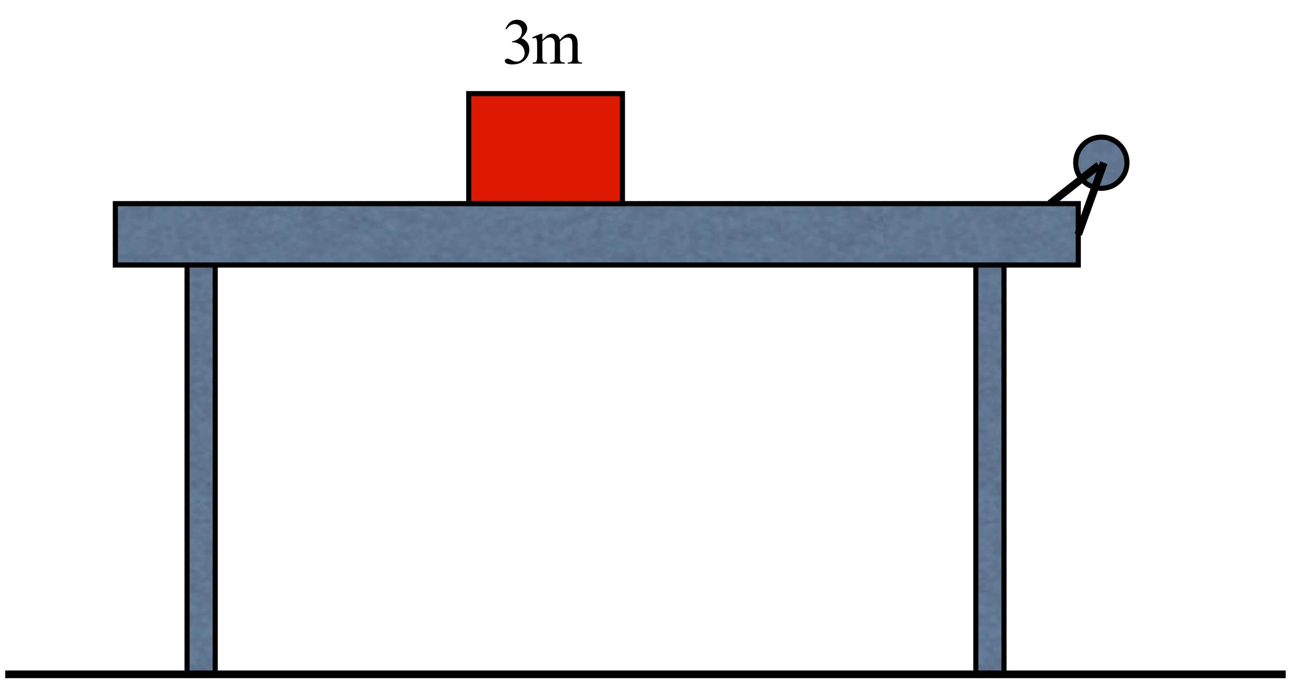
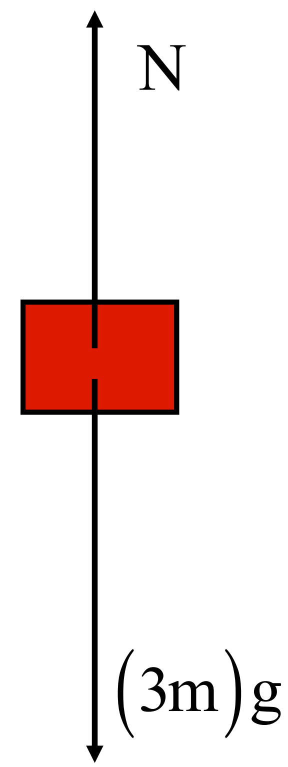
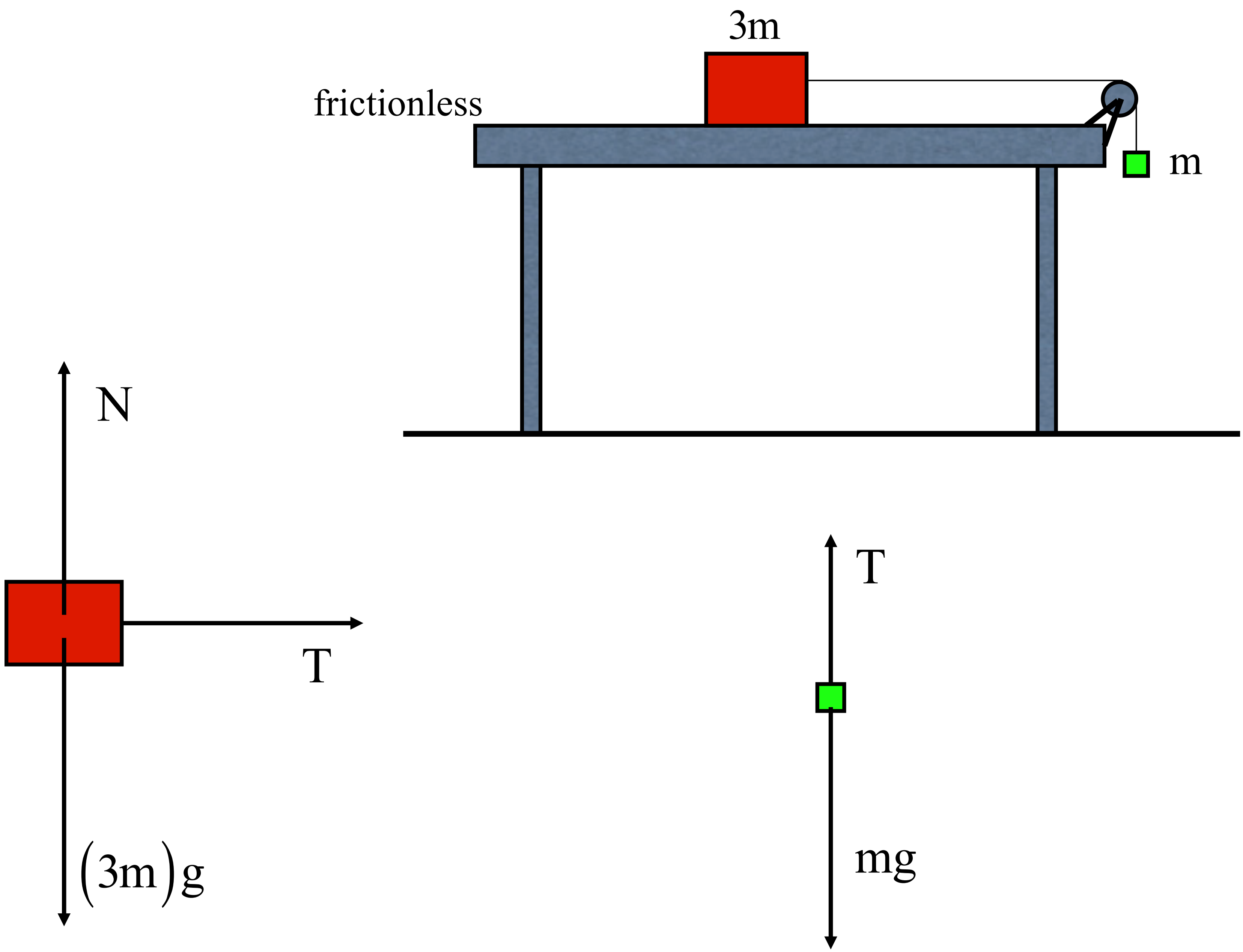
FREE BODY DIAGRAMS SOLUTIONS

1.)

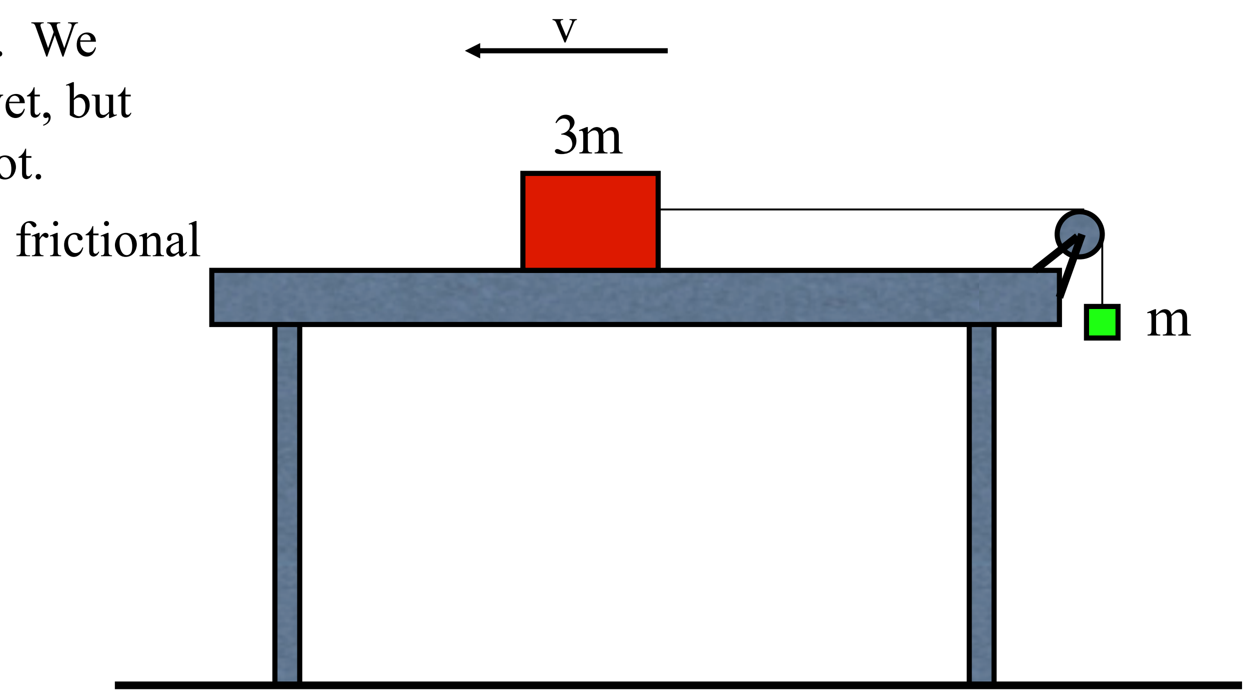


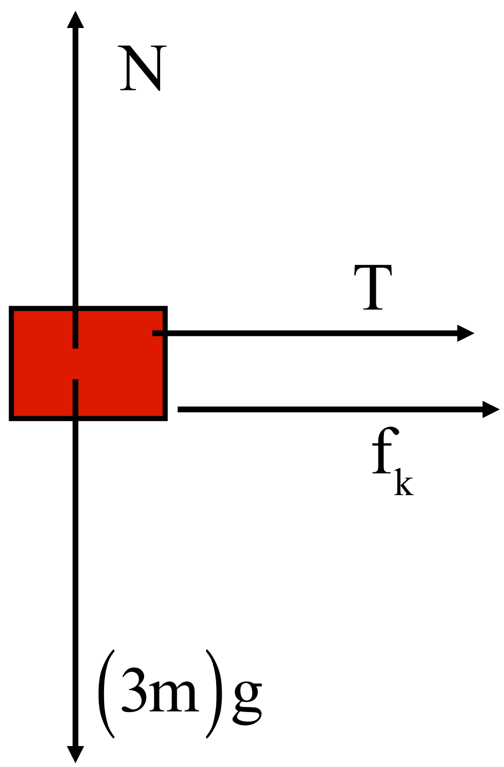


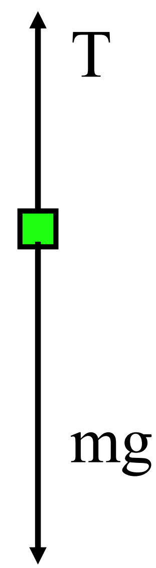
2.) *Note:* A ”massless,” frictionless pulleys just redirect the line of the tension.



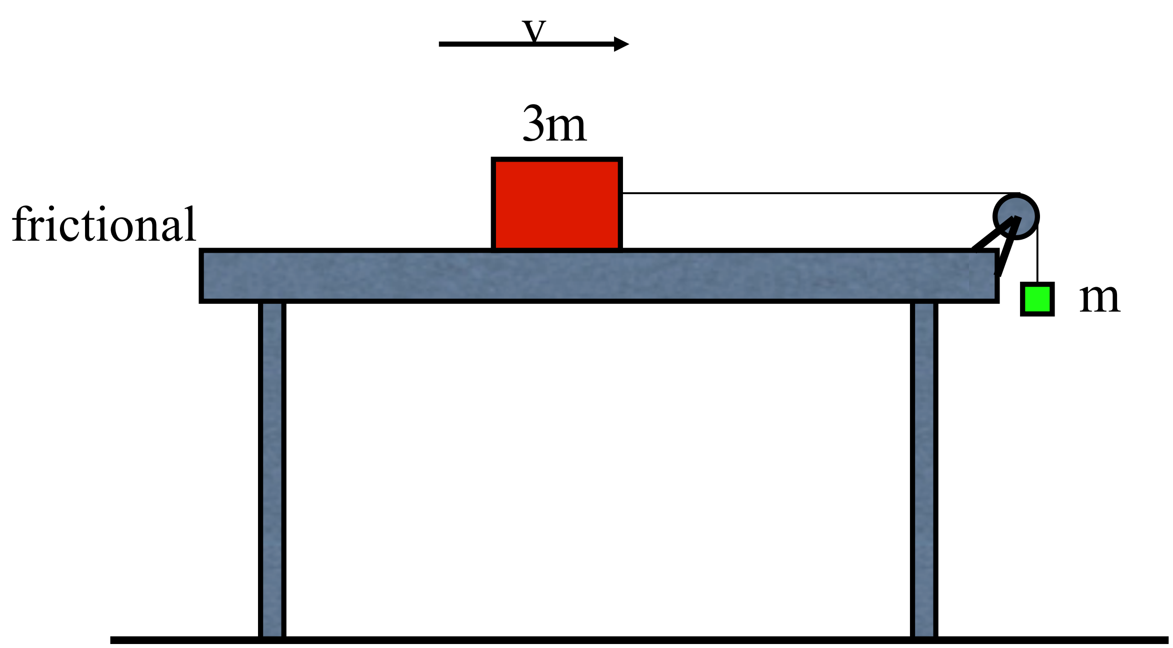
3.) *Note:* This problem has friction and the velocity direction is given. We haven't talked about friction yet, but use your head and give it a shot.

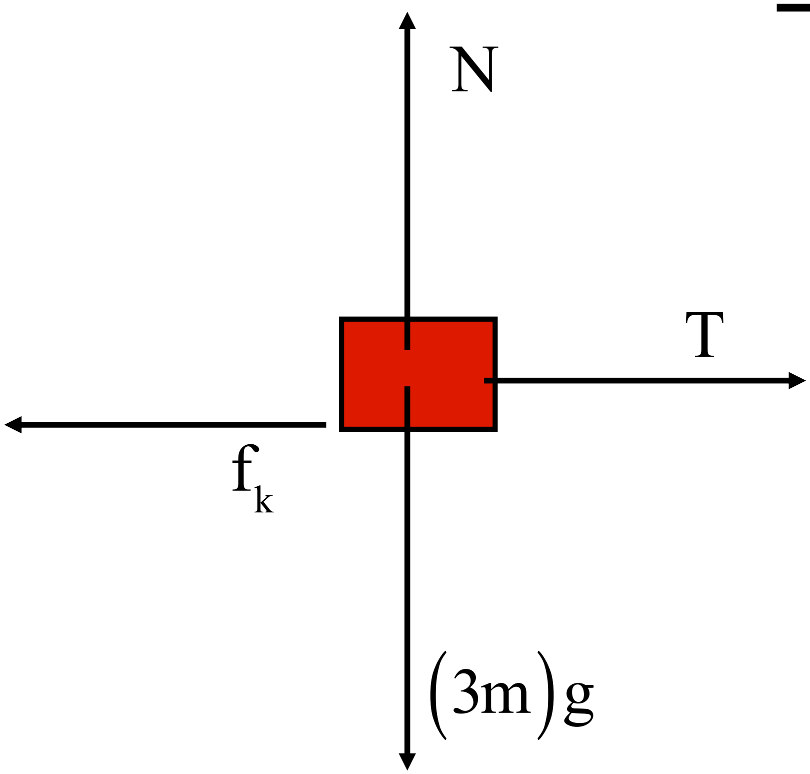


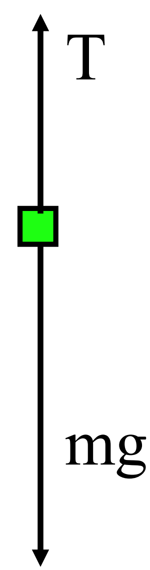




4.)







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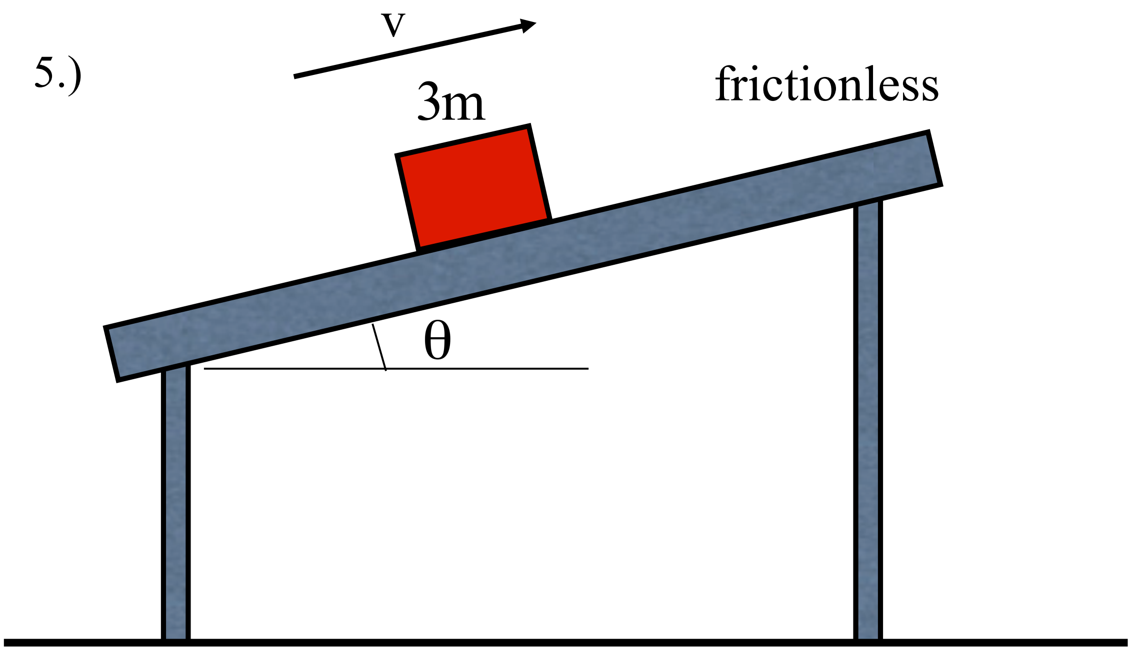
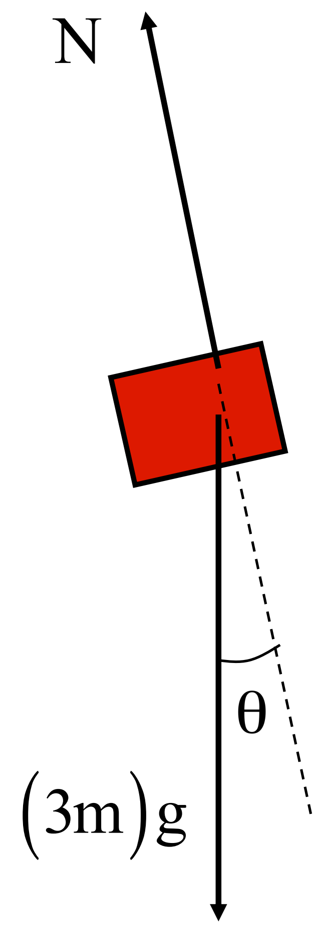
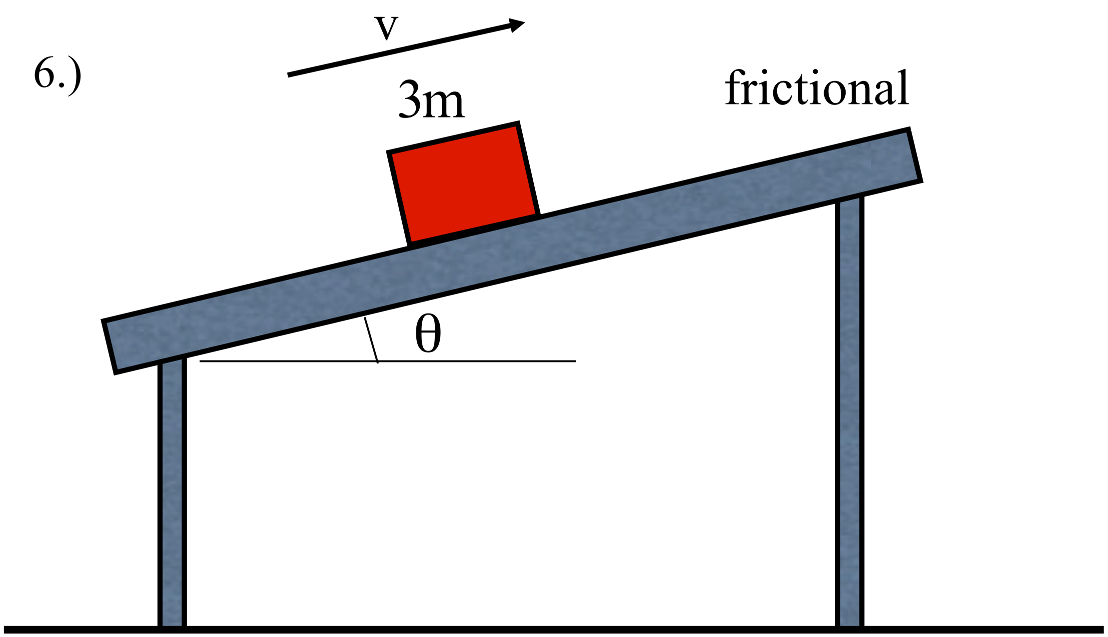
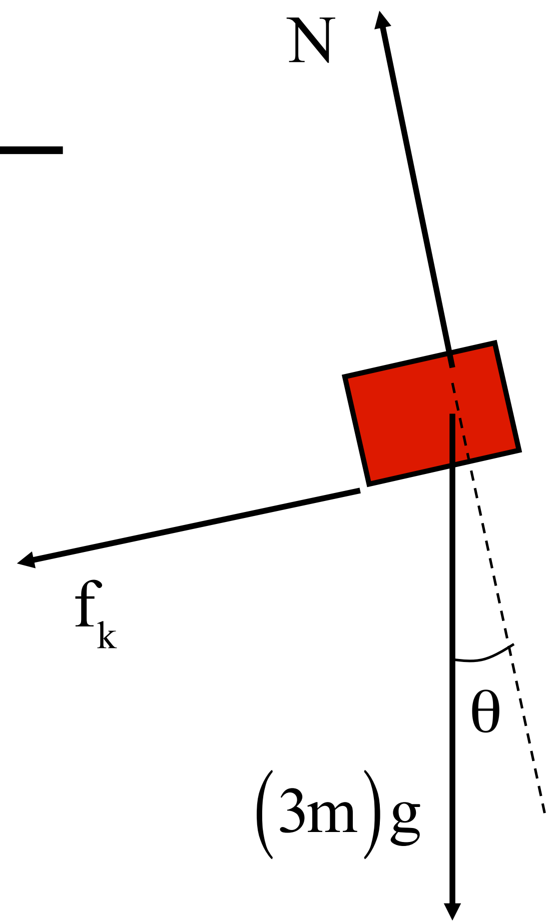
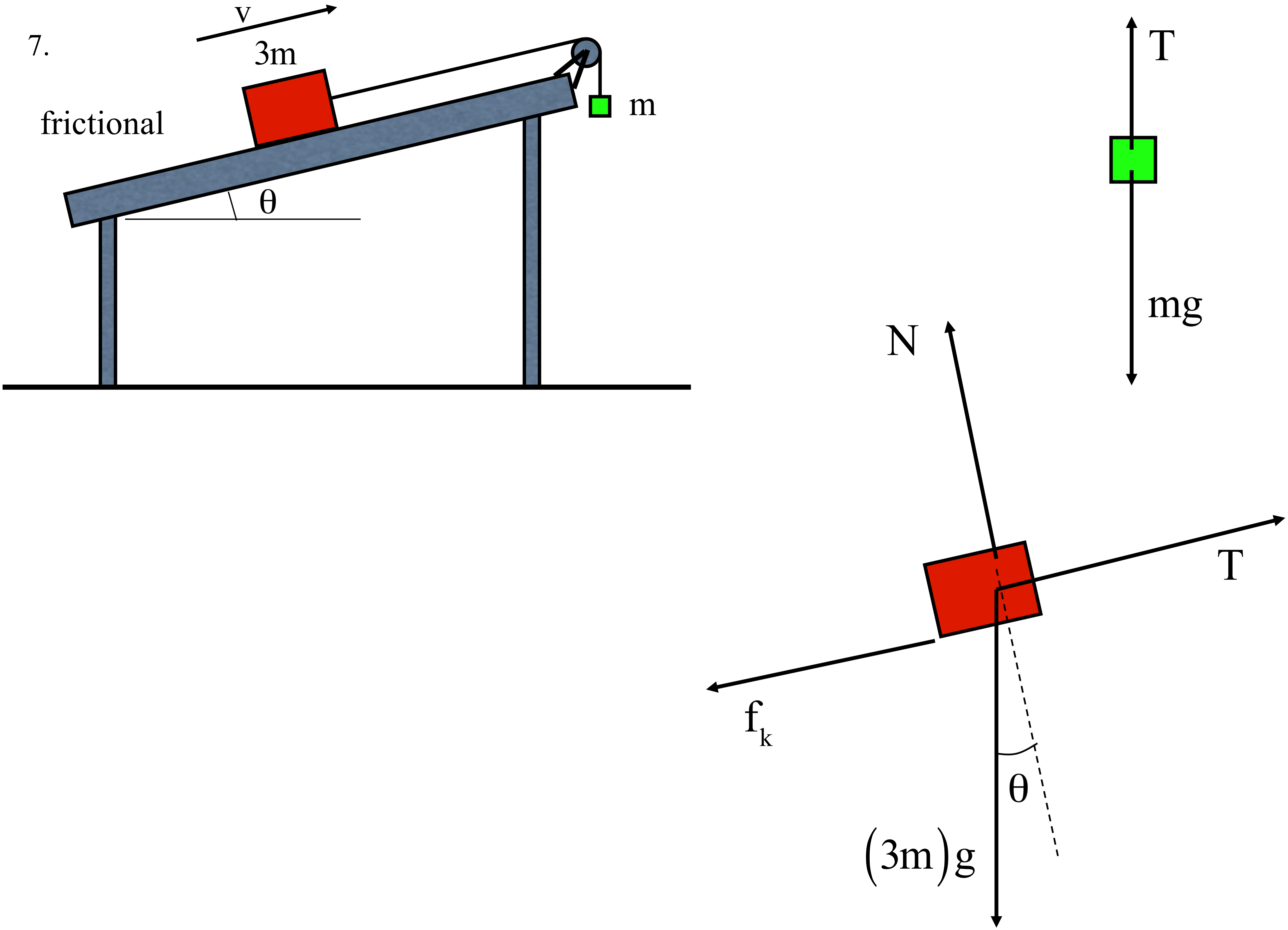




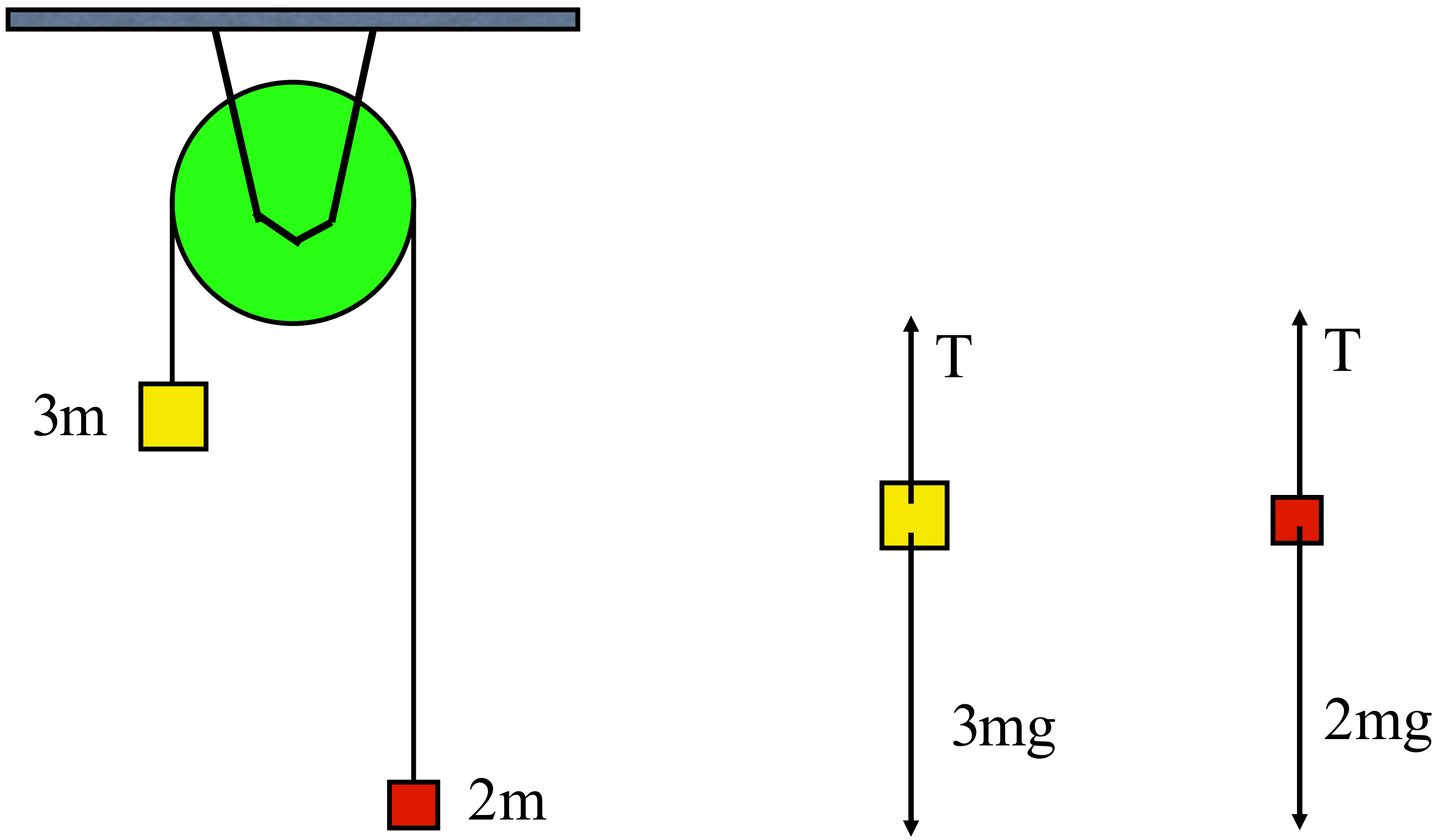
6.)



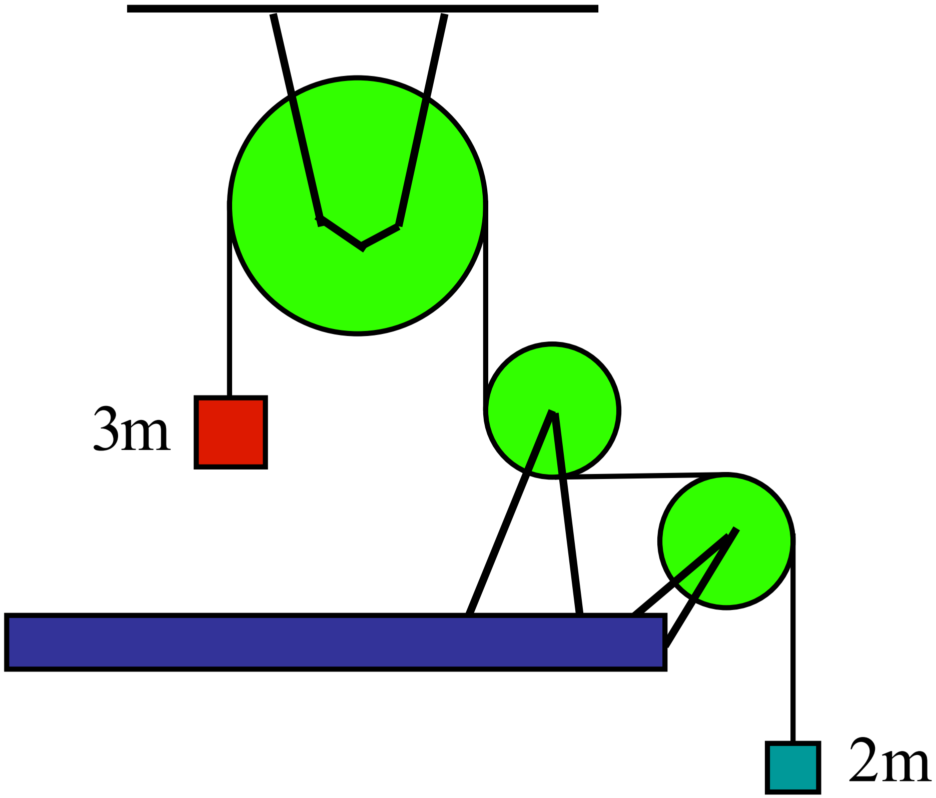


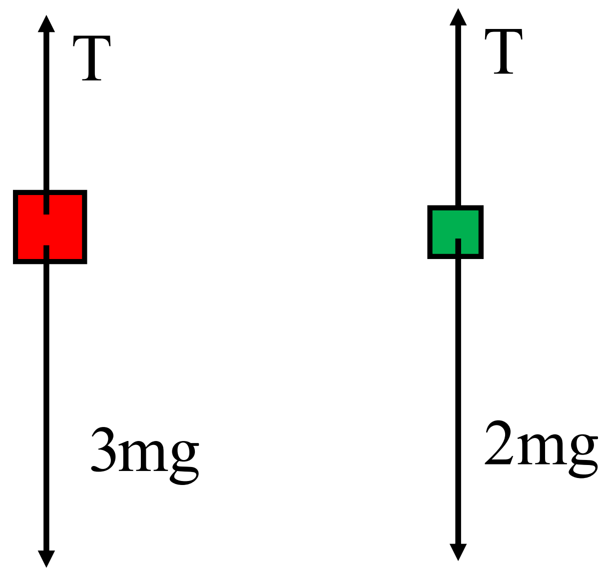

7.
v
3m
m
frictional
θ
T
mg
N
T
f_k
θ
(3m)g

8.)



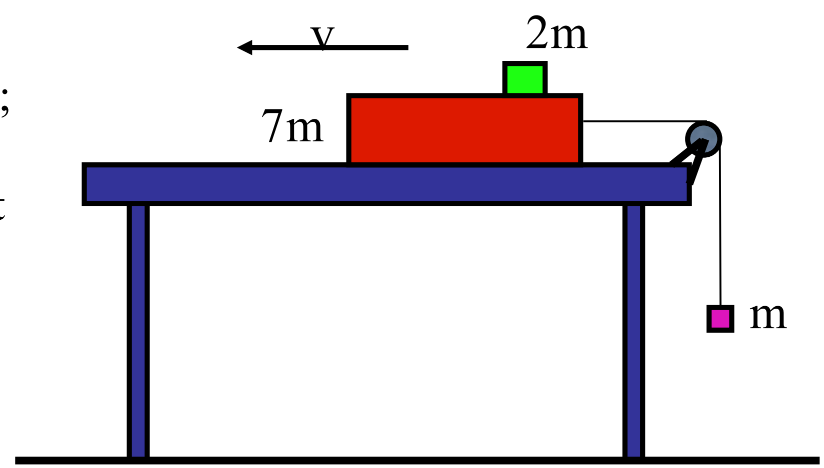
9.) *Note:* Remember, "massless," frictionless pulleys just redirect the line of the tension.





10.)

frictional on both surfaces; (7m mass moving to left initially with 2m mass just barely holding on)



Comment: Notice that gravity acting on the hanging mass is the only external force in the system (disconnect "m" and nothing accelerates). That means it governs the net acceleration. As the hanging mass is accelerating downward, both the 7m and 2m masses must be accelerating to the right (even though they are moving to the left), which means they are slowing down. That means there better be a net force to the right in both cases. The only place the 2m guy can get its right-directed force is from static friction between it and the 7m mass. That means there's a static frictional force on the 7m mass to the left (Newton's Third Law). Also, there's a kinetic frictional force on the 7m mass due to the floor and two different normal forces to deal with. Fun, eh?