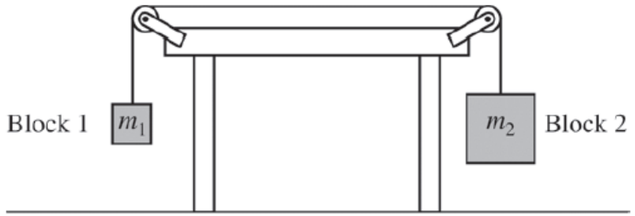
Connected Blocks I - Dynamics

A system of two or more blocks that are connected by a string via a pulley (block) is called an ATWOOD MACHINE (probably after a Mr Atwood?) The usual use in the real world is in helping raise or lower objects. In physics, they are used to illustrate forces on different objects and to help students appreciate free-body diagrams, simultaneous equations and Newton's 2nd



Draw in the acceleration arrows and label them.

What do you know about the tension in the string?

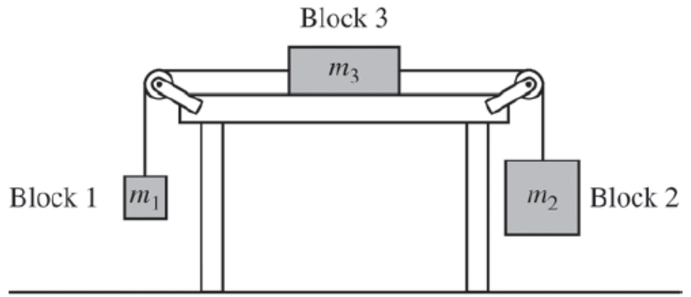
Free-body diagrams – BE CAREFUL IN DRAWING THE RELATIVE SIZES OF THE FORCES!

Block 1	Block 2

Newton's 2nd Law Equations – why not 'forces up = forces down'?

Block 1	Block 2

Harder question: We assume that the pulleys are mass-less and have no friction. What would be the effects otherwise?



What is the major change in this situation?

Will the acceleration of the system be larger, smaller or the same? Explain your answer.

Will the left string have more, less or the same tension as the string on the right? Explain your answer.

Assuming that there is friction between the table surface and block 3, draw fully labelled free-body diagrams of the 3 blocks. (Coefficient of friction = μ)

Block 1	Block 3	Block 2

Bonus: Determine the acceleration of the 3-block system.