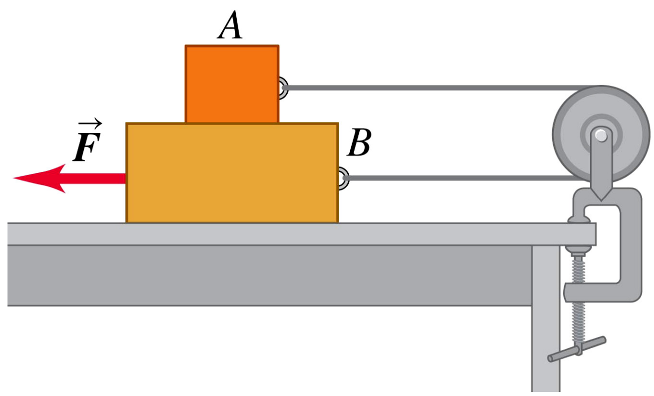
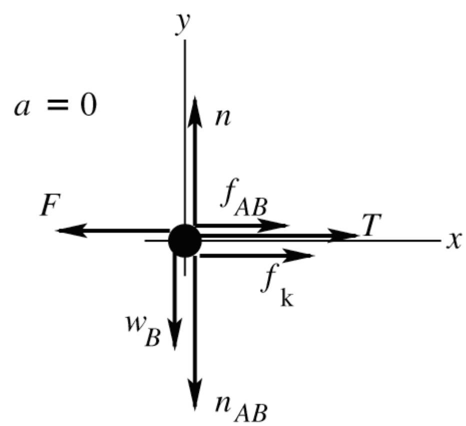
Problem 5.83 is concerned with the force needed to move two blocks that are in a rather odd configuration. It specifies that block A weighs 1.4 N, block B weighs 4.2 N, and μ = 0.3 for all friction in the problem. The force **F** is just enough to move the blocks at constant speed.



The textbook's solution to this problem is a monument to poor education. Among other things, it includes a free-body diagram that shows no less than seven different forces, denoted by nine symbols, and pointing in four directions (see the mess at left).



We do not have seven forces acting in this problem. Let's do it a bit more physically. The frictional force operating at the interface between block B and the table is $F = \mu N$, where in this case $N = 4.2\text{ N} + 1.4\text{ N} = 5.6\text{ N}$. (The problem is nice enough to give us the actual weights, so we don't need to use F = mg.) We have $F = (0.3)(5.6) = 1.68\text{ N}$ for the force needed to move block B.

The frictional force operating between block A and block B is $F = \mu N = (0.3)(1.4) = 0.42\text{ N}$. However, there is a subtle wrinkle that we have to worry about for this friction. Inspection of the figure reveals that if I move block B one meter to the left, then block A must move one meter to the right. Put another way, if force **F** is applied through a distance of one meter, then the friction between blocks A and B will be applied through ***two*** meters, because that is how far the blocks move *relative* to each other.

So, I have to double the frictional force between A and B, to $F = 0.84\text{ N}$. This gives us the final force necessary to move this odd arrangement: $F = 1.68\text{ N} + 0.84\text{ N} = 2.52\text{ N}$.