Reminder of steps for solving interacting-objects problems

1. Draw a picture
2. Identify acceleration constraints
3. Identify all interaction (interaction diagram if needed)
4. Draw separate free-body diagrams for each object
5. Identify action/reaction pairs (Newton's 3rd law)
6. **Apply Newton's 2nd law to each object**
7. Equate action/reaction pairs.
8. Solve for acceleration. Kinematic equations

Python: system of equations

Harder Problem

The 1.0 kg block in the figure is tied to the wall with a rope. It sits on top of a 2.0 kg block. The lower block is pulled to the right with a 20 N tension force. The coefficient of kinetic friction between all surfaces is 0.40.

a)   What is the tension in the rope holding the 1.0 kg block?
b)   What is the acceleration of the 2.0 kg block?

a)   Draw the free body diagrams for both blocks (6 forces for bottom block and 4 forces on the top)
b)   Identify the action/reaction pairs
c)   Write down Newton's second law in the x and y directions for both blocks (4 equations)
d)   Work on the math to solve the system of equations.
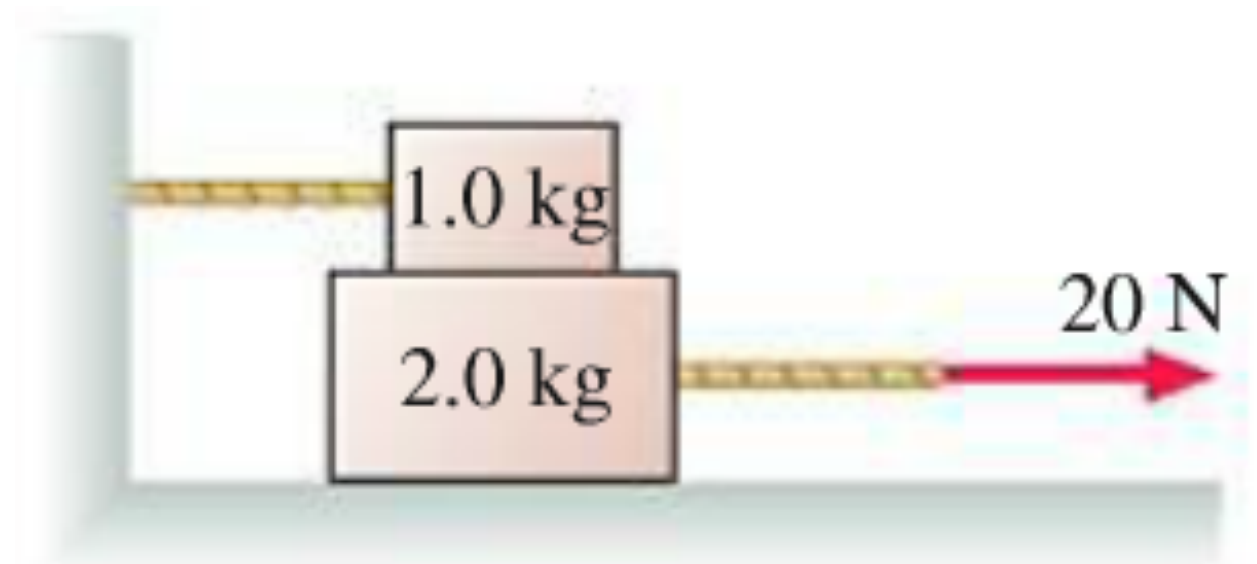
Find an expression for the tension in the rope and the acceleration of the blocks

a) Draw the free body diagrams for both blocks
b) Identify the action/reaction pairs
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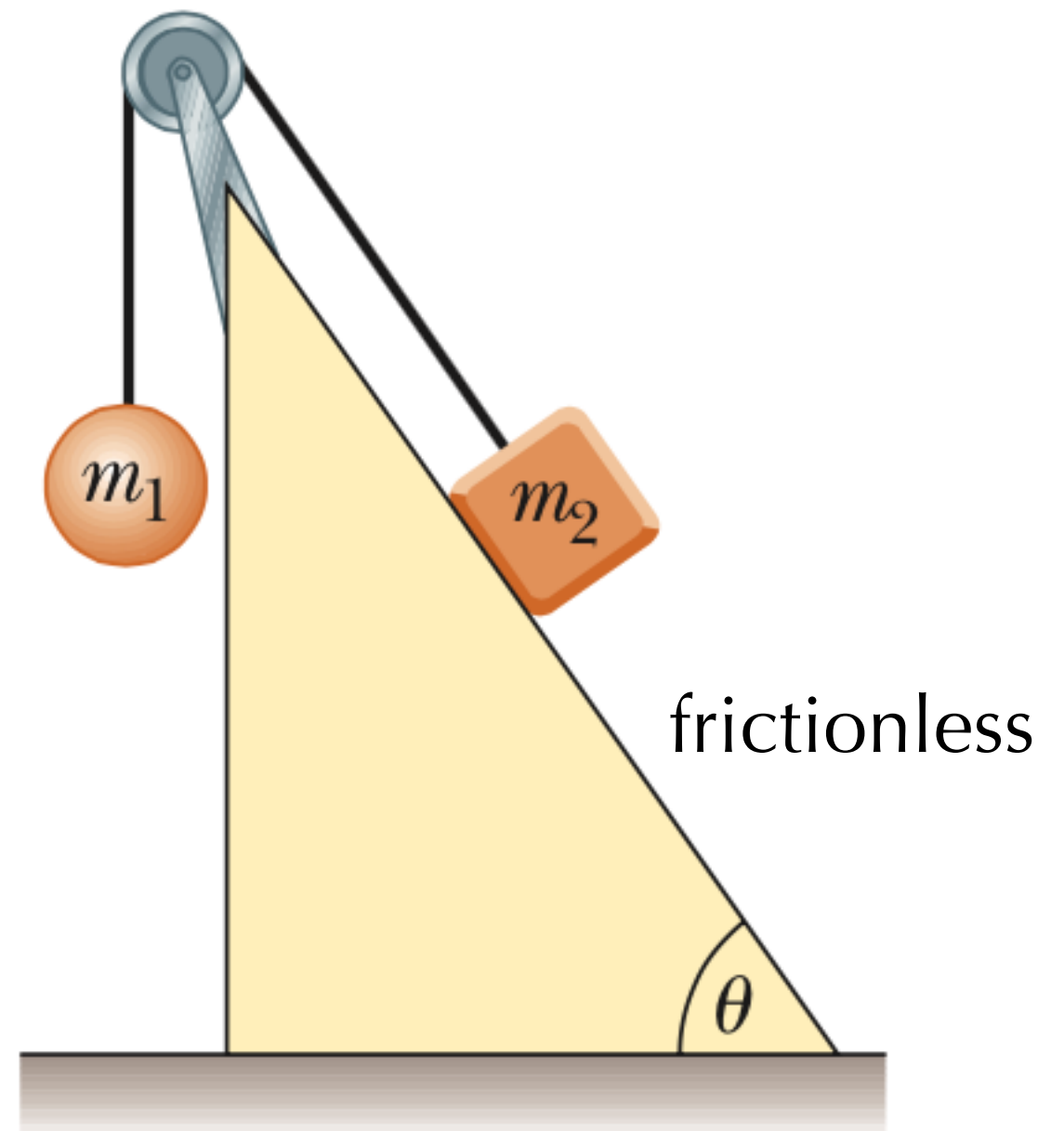
frictionless

The 10.2 kg block is held in place by a force applied to the rope. Find the tensions T_1 to T_5 and the magnitude of F.