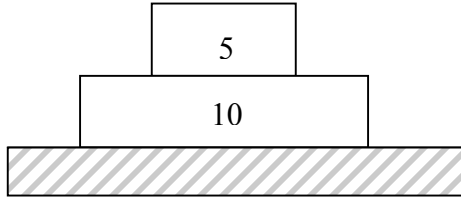


## Surface Forces (Statics)

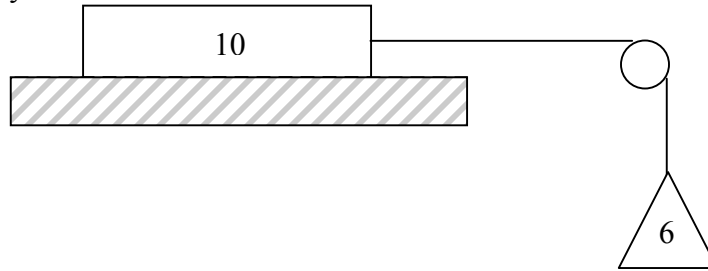
Find the surface forces (Normal Force and Friction Force) exerted by the rough floor in the following situations:

1. A 5 kg block sits on top of a 10 kg block on the floor. The blocks are at rest.



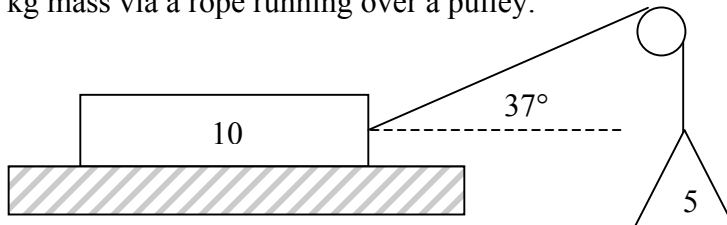
2. The same blocks are moving horizontally across the floor at constant velocity.

3. A 10 kg block is at rest on the floor. The block is attached to a 6 kg mass hanging from a pulley.

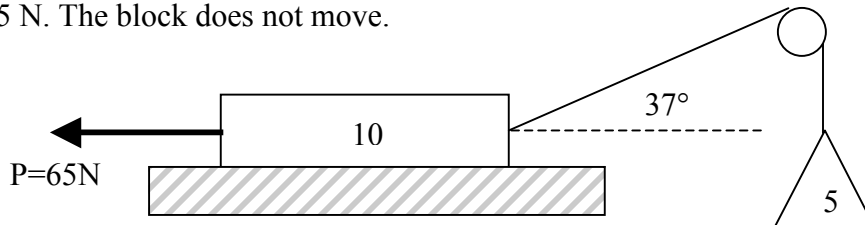


4. The same 10 kg block is moving to the right with unchanging speed.

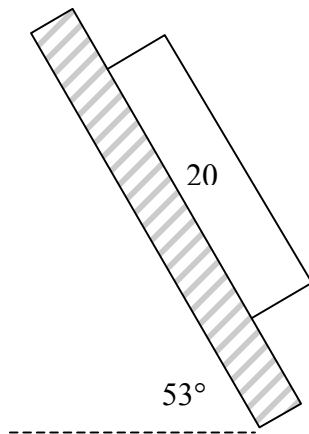
5. A 10 kg block is at rest on the floor. It is being pulled upward and to the right by a hanging 5 kg mass via a rope running over a pulley.



6. A 10 kg block attached to a 5 kg hanging mass by a rope is being pulled to the left by a force of 65 N. The block does not move.

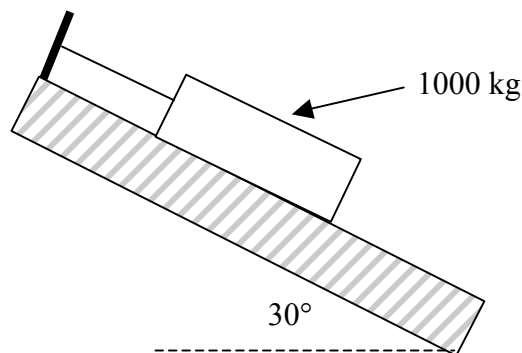


7. A 20 kg block sits on a rough floor inclined at  $53^\circ$ . The block does not move. (What is unrealistic about this situation?)



8. How do the forces in number 7 change if the block is seen to be sliding down the incline at a constant speed??

9. A block of mass 1000 kg is sitting on a **smooth**, inclined floor and tied to a pole by a cable. In this case, find the force(s) exerted by the floor and the tension in the cable.



10. If the floor in number 9 were not smooth but rough, determine the surface forces exerted by the floor if the tension in the cable is measured to be 300 N.

11. If the tension in the cable in number 10 were not known, what would be the possible range of friction forces exerted by the surface?