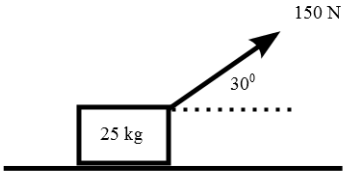
Newton's Laws of Motion

Physics **Review** **RBRHS**

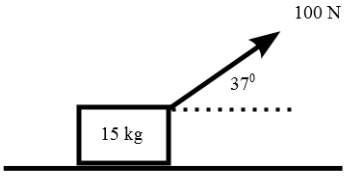
1. A block of mass 25 kg on a horizontal surface is pulled to the right by a force F. The coefficient of static friction between the block and the surface is 0.6 and the coefficient of kinetic friction is 0.5.
   (a) If $F = 100\ N$, will the object move?
   (b) If $F = 150\ N$, will the object move? Determine its acceleration.

2. A block of mass 20 kg on a horizontal surface is pulled to the right by a force of 200 N. The coefficient of static friction between the block and the surface is 0.7 and the coefficient of kinetic friction is 0.65. Determine the acceleration of the block.

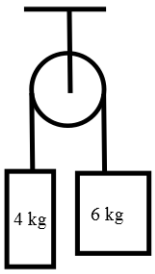
3. A block of mass 25 kg is pulled by a force of 150 N as shown in figure below. The coefficient of static friction between the block and the surface is 0.5 and the coefficient of kinetic friction is 0.45. Determine the acceleration of the block.



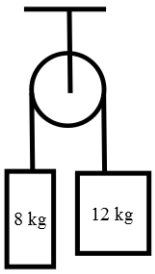
4. A block of mass 15 kg is pulled by a force of 100 N as shown in figure below. The coefficient of static friction between the block and the surface is 0.4 and the coefficient of kinetic friction is 0.35. Determine the acceleration of the block.



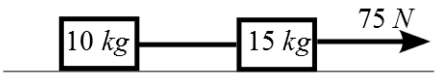
5. Two blocks of masses 4 kg and 6 kg are connected by a light and inextensible string that passes over a frictionless and massless pulley as shown below. Draw a free body diagram labeling the forces that are acting on the blocks. Determine the acceleration of the blocks and the tension in the string connecting the two masses.



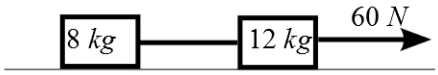
6. Two blocks of masses 8 kg and 12 kg are connected by a light and inextensible string that passes over a frictionless and massless pulley as shown below. Draw a free body diagram labeling the forces that are acting on the blocks. Determine the acceleration of the blocks and the tension in the string connecting the two masses.



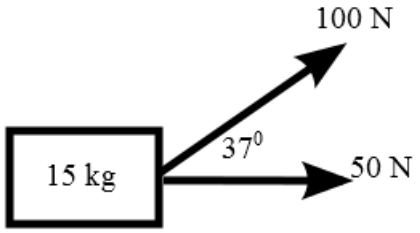
7. Two blocks connected by a light and inextensible string, as shown below, are pulled to the right. Determine the tension in the string and the acceleration of the blocks.



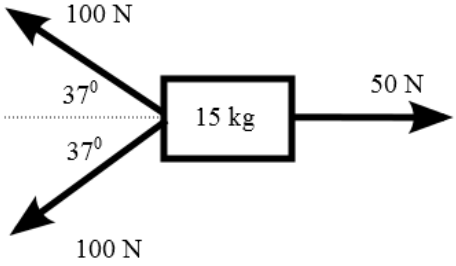
8. Two blocks connected by a light and inextensible string, as shown below, are pulled to the right. Determine the tension in the string and the acceleration of the blocks.



9. Two forces are exerted on a block of mass 15 kg as shown in the figure below. Find the magnitude and direction of the resultant force. Determine the magnitude and direction of the acceleration of the block.



10. For the following figure, determine the magnitude and direction of the resultant force and the magnitude and direction of the resultant acceleration.



11. A vehicle of mass 1200 kg moving with a speed of 25 m/s accelerates to a speed of 35 m/s is 2 s. Determine the average force exerted on the vehicle during this time interval.

12. A person of mass 75 kg is in an elevator that is accelerating down at a rate of 0.5 m/s^2. Determine the contact force on the person due to the floor of the elevator.

13. A person of mass 80 kg is in an elevator that is accelerating up at a rate of 0.3 m/s^2. Determine the contact force on the person due to the floor of the elevator.

14. A block of mass 12 kg is attached to a string that is attached to the ceiling of an elevator. The tension in the string is 60 N. Determine the magnitude and direction of the acceleration of the elevator.

15. A vehicle of mass 1200 kg moving with a speed of 25 m/s accelerates to a speed of 35 m/s is 2 s. Determine the average force exerted on the vehicle during this time interval.

16. A vehicle of mass 1500 kg moving with a speed of 10 m/s accelerates to a speed of 20 m/s covering a distance of 40 m. Determine the force exerted on the vehicle while it is accelerating.

17. Define inertia.

18. State Newton's First Law.

19. State Newton's Second Law.

20. State Newton's Third Law.

21. What is the weight of an object of mass 500 kg.

22. What is the mass of an object that weighs 1200 N.

23. A person is in an elevator that is accelerating downward. Is it possible for the contact force between the person and the elevator to be zero? If yes, explain.

24. A person is in an elevator that is accelerating downward. Is it possible for the contact force between the person and the elevator to be twice the weight of the person? If yes, explain.

25. When an object is in equilibrium, the net force on the object is zero. Determine the magnitude and direction of the force necessary to keep the block in problems 9 and 10 in equilibrium.