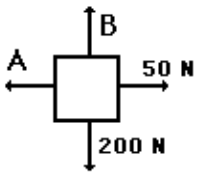
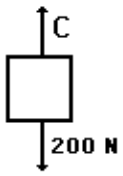
Newton's Law Review Package

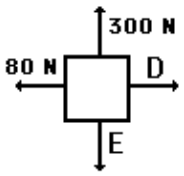
1. Free-body diagrams for four situations are shown below. The net force is known for each situation. However, the magnitudes of a few of the individual forces are not known. Determine the magnitude of the unknown forces.



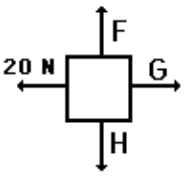
F_{net} = 0 N



F_{net} = 900 N, up



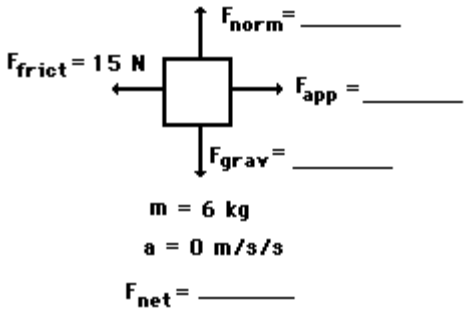
F_{net} = 60 N, left



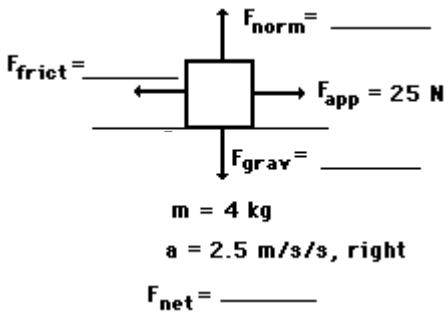
F_{net} = 30 N, right

A _____ B _____ C _____ D _____ E _____ F _____ G _____

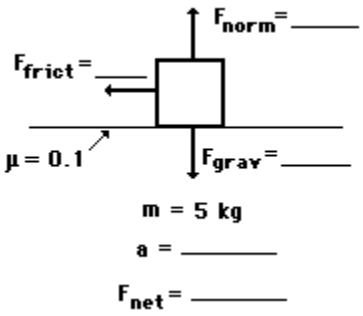
2. A rightward force is applied to a 6-kg object to move it across a rough surface at constant velocity. The object encounters 15 N of frictional force. Use the diagram to determine the gravitational force, normal force, net force, and applied force. (Neglect air resistance.)



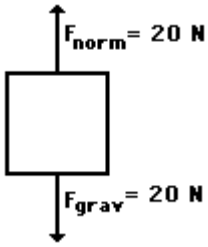
3. A rightward force of 25 N is applied to a 4-kg object to move it across a rough surface with a rightward acceleration of 2.5 m/s/s. Use the diagram to determine the gravitational force, normal force, frictional force and net force. (Neglect air resistance.)



4. A 5-kg object is sliding to the right and encountering a friction force which slows it down. The coefficient of friction ("mu") between the object and the surface is 0.1. Determine the force of gravity, the normal force, the force of friction, the net force, and the acceleration. (Neglect air resistance.)



5. Two students are discussing their physics homework prior to class. They are discussing an object which is being acted upon by two individual forces (both in a vertical direction); the free-body diagram for the particular object is shown below. During the discussion, Anna Litical suggests to Noah Formula that the object under discussion could be moving. In fact, Anna suggests that if friction and air resistance could be ignored (because of their negligible size), the object could be moving in a horizontal direction.
Noah Formula objects, arguing that the object could not have any horizontal



motion if there are only vertical forces acting upon it. Noah claims that the object must be at rest, perhaps on a table or floor. After all, says Noah, an object experiencing a balance of forces will be at rest.

Who do you agree with? Why?

6. What acceleration will result when a 12-N net force applied to:

   a) a 3-kg object?

   b) a 6-kg object?

7. A net force of 16 N causes a mass to accelerate at a rate of 5 m/s^2. Determine the mass.

8. An object is accelerating at 2 m/s^2. If the net force is tripled and the mass is doubled, then what is the new acceleration?

9. An object is accelerating at 2 m/s^2. If the net force is tripled and the mass is halved, then what is the new acceleration?

10. What is the weight of a 3.4 kg mass?

11. What mass has a weight of 720 N?

12. Bob must exert 240 N of force on a 980 Kg car to move it at a constant speed horizontally. (The frictional force is 240 N) What is the acceleration of the car if he exerts a force of 350 N?

13. What is the acceleration of a 6.0 kg object hanging on a string that is under a tension of 80.0 N?

14. What force is needed to accelerate a 60.0 kg cart and rider from rest to 4.2 m/s in 2.5 seconds when the friction force is 24 N?

15. What is the mass of a box that moves at a constant velocity along a surface with a force of 15 N, and accelerates at 4.2 m/s^2 when you exert 26 N?

16. If you exert a force of 60. N on a car, it moves at a constant velocity. (i.e. there is a frictional force of 60. N) What is its mass if when you exert 80 N on it, it accelerates from rest to 2.0 m/s in 100. seconds?

17. A 60.0 kg rocket accelerates upward from rest reaching a height of 23.4 m in 3.0 seconds. What is the thrust force produced by the engine?

18. It takes 45 N to make a 10.0 kg cart move at a constant speed. What force does it take to make the cart accelerate at 3.2 m/s^2 in the direction it is moving?

19. What tension would accelerate a 5.0 kg object suspended on a string
a) upwards at 6.2 m/s^2?

b) downwards at 6.2 m/s^2?

1) A = 50 N B = 200N C = 1100 N D = 20 N E = 300 N F = H G = 50 N 2) Fn = 59 N; Fapp = 15 N; Fg = 59 N; Fnet = 0 N 3) Fn = 39 N; Ff = 15 N; Fg = 39 N; Fnet = 10 N 4) Fn = 80 N; m = 8.2 kg; a = 4.9 m/s^2; Fnet = 40 N 5) Anna 6)a. 4 m/s^2 b. 2 m/s^2 7) 3.2 kg 8) 3 m/s^2 9) 12 m/s^2 10) 33 N 11) 73 kg 12) 0.11 m/s^2 13) 3.5 m/s^2 14) 125 N 15) 2.6 kg 16) 1000 kg 17) 901 N 18) 77 N 19)a. 80. N b. 18 N