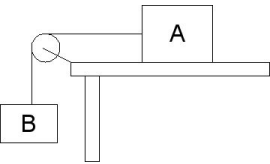


Friction and Forces - Physics 112 Worksheet

1. A crate weighing 600 N is being pushed across a level floor at a speed of 5.0 m/s by a horizontal force of 60.0 N. What is the coefficient of friction between the bottom of the crate and the floor. (0.100)
2. A box weighing 500 N is being pulled across a level floor at a constant speed by a force of 50.0 N that acts upward at an angle of 30° to the floor.
 - a. What is the force that actually pulls the box along the floor? (43.3 N)
 - b. What is the force of friction that opposes the motion? (43.3 N)
 - c. What is the normal force in this case? (475 N)
 - d. What is the coefficient of friction? (0.0912)
3. A truck weighing 3000 N is being pushed across a level floor with a constant speed by a force of 500 N that acts downward at an angle of 20° to the floor.
 - a. What is the force of friction acting on the bottom of the trunk? (470 N)
 - b. What is the normal force? (3.16×10^3 N)
 - c. What is the coefficient of friction? 0.148)
4. A net force of 25 N is applied to a cart which weighs 125 N. What is the acceleration of this cart? (2.0 m/s²)
5. What force must be applied to a 60 N object to accelerate it at a rate of 3.0 m/s², if the force of friction is 5.0 N? (23 N)
6. A 5.0 kg box is pushed along a horizontal floor by a force of 25 N, parallel to the floor. The force of friction which opposes this motion is 10 N. If the box started from rest, what will be its speed after 5.00 s? (15 m/s)
7. How long does it take a net force of 100 N acting on a 50.0 kg rocket to increase the rocket's speed from 100 m/s to 150 m/s? (25.0 s)
8. What braking force is needed to bring a 1500 kg car moving 30.0 m/s to rest 5.00 seconds after the brakes are applied? (9.00×10^3 N)
9. An object weighing 15 N is thrown forward on the ice with a speed of 20 m/s and after 5.0 s it has only half its original speed. Find the coefficient of friction between the object and the ice. (0.20)
10. A body which weighs 10 N is pushed across a level floor by a person who exerts a force of 5.0 N parallel to the floor. The coefficient of friction is 0.20. What is its acceleration? (3.0 m/s²)
11. A person pulls a 50 kg object along a level surface by a rope which makes an angle of 30° with the horizontal. If she exerts a force of 200 N on the rope, and if the coefficient of friction is 0.20, at what rate does the object accelerate? (1.9 m/s²)
12. A person pushes a box of mass 80.0 kg along a level floor. The person's arms make an angle of 25° with the horizontal and a force of 400 N is exerted. If the coefficient of friction is 0.250, what is the acceleration of the box? (1.56 m/s²)
13. Two blocks are joined as in the diagram below. The mass of block A is 8.0 kg, and the mass of block B is 2.0 kg. If block A is on a frictionless surface, calculate its acceleration. (2.0 m/s²)



The diagram shows a rectangular block labeled 'A' on a horizontal surface. A rope is attached to the left side of block A, passes over a pulley at the edge of the surface, and then hangs vertically down to a smaller rectangular block labeled 'B'.
14. Two blocks are joined as in the above diagram. Block A has a mass of 30 kg and Block B has a mass of 12 kg. If the coefficient of friction between the surface and block A is 0.20, find the acceleration of mass A. (1.4 m/s²)
15. A rocket weighs 350 N. What is the total thrust needed to make it accelerate upwards at the rate of 25.0 m/s²? (1.24×10^3 N)
16. A 100 gram bullet moving at a velocity of 600 m/s strikes a solid block of wood and penetrates to a depth of 20.0 cm. What is the retarding force that the block exerts on the bullet? (-9.00×10^4 N)
17. Two blocks A and B have masses of 7.0 kg and 4.0 kg respectively. They are connected by a rope over a single fixed pulley. Assuming the pulley to be frictionless, calculate the acceleration of the two blocks and find the tension in the rope. (2.7 m/s², 50 N)
18. A 2000 kg car crashes into a solid wall while travelling 50 km/h. If the car moves 0.50 m (the back of the car moves closer to the front of the car by 0.50 m) after it strikes the wall, calculate the force the wall exerts while stopping the car. (-3.92×10^5 N)
19. A 750 N person slides down a rope that can only hold 700 N. What must the person's acceleration be in order that the rope not break? (0.65 m/s²)