

Text book Problems - Unit 7 Work and Energy

2. Discuss whether any work is being done by each of the following agents and, if so, whether the work is positive or negative.
- a chicken scratching the ground
 - a person studying
 - a crane lifting a bucket of concrete
 - the force of gravity on the bucket in (c)
5. The drivers of two identical cars heading toward each other apply the brakes at the same instant. The skid marks of one of the cars are twice as long as the skid marks of the other vehicle. Assuming that the brakes of both cars apply the same force, what conclusions can you draw about the motion of the cars?
- Figure 5-17**
9. A catcher “gives” with a baseball when catching it. If the baseball exerts a force of 475 N on the glove such that the glove is displaced 10.0 cm, how much work is done by the ball?
(See Sample Problem 5A.)
10. A flight attendant pulls her 70.0 N flight bag a distance of 253 m along a level airport floor at a constant velocity. The force she exerts is 40.0 N at an angle of 52.0° above the horizontal. Find the following:
- the work she does on the flight bag
 - the work done by the force of friction on the flight bag
 - the coefficient of kinetic friction between the flight bag and the floor
- (See Sample Problem 5A.)
14. Two identical objects move with speeds of 5.0 m/s and 25.0 m/s. What is the ratio of their kinetic energies?
16. A car traveling at 50.0 km/h skids a distance of 35 m after its brakes lock. Estimate how far it will skid if its brakes lock when its initial speed is 100.0 km/h. What happens to the car’s kinetic energy as it comes to rest?

19. What is the kinetic energy of an automobile with a mass of 1250 kg traveling at a speed of 11 m/s?
(See Sample Problem 5B.)
28. A bowling ball is suspended from the center of the ceiling of a lecture hall by a strong cord. The ball is drawn up to the tip of a lecturer's nose at the front of the room and then released. If the lecturer remains stationary, explain why the lecturer is not struck by the ball on its return swing. Would this person be safe if the ball were given a slight push from its starting position at the person's nose?
30. A ball is thrown straight up. At what position is its kinetic energy at its maximum? At what position is gravitational potential energy at its maximum?
33. A child and sled with a combined mass of 50.0 kg slide down a frictionless hill that is 7.34 m high. If the sled starts from rest, what is its speed at the bottom of the hill?
(See Sample Problem 5E.)

Second Semester - rest of Unit 7

7. A person lifts a 4.5 kg cement block a vertical distance of 1.2 m and then carries the block horizontally a distance of 7.3 m. Determine the work done by the person and by the force of gravity in this process. (See Sample Problem 5A.)
35. If an automobile engine delivers 50.0 hp of power, how much time will it take for the engine to do 6.40×10^5 J of work? (Hint: Note that one horsepower, 1 hp, is equal to 746 watts.) (See Sample Problem 5E.)
45. A 0.60 kg rubber ball has a speed of 2.0 m/s at point A and kinetic energy of 7.5 J at point B. Determine the following:
- the ball's kinetic energy at A
 - the ball's speed at B
 - the total work done on the ball as it moves from A to B
57. A 75 kg man jumps from a window 1.0 m above a sidewalk.
- What is his speed just before his feet strike the pavement?
 - If the man jumps with his knees and ankles locked, the only cushion for his fall is approximately 0.50 cm in the pads of his feet. Calculate the magnitude of the average force exerted on him by the ground in this situation.