

Pre-AP Physics – Textbook problems Ch. 5: Work, Energy and Power #'s 7, 8, 9, 19, 35, 37, 39, 52, 53, 57, 61, and 62

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.)
8. A plane designed for vertical takeoff has a mass of 8.0×10^3 kg. Find the net work done by all forces on the plane as it accelerates upward at 1.0 m/s^2 through a distance of 30.0 m after starting from rest. (See Sample Problem 5A.)
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.)

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.)

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.)

37. A 215 g particle is released from rest at point A inside a smooth hemispherical bowl of radius 30.0 cm, as shown in Figure 5-20. Calculate the following:

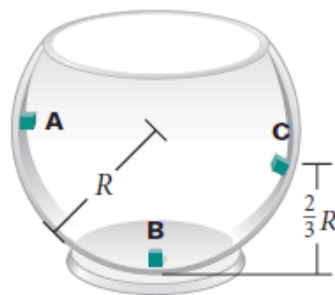


Figure 5-20

- the gravitational potential energy at A relative to B
- the particle's kinetic energy at B
- the particle's speed at B
- the potential energy and kinetic energy at C

39. A 50.0 kg pole vaulter running at 10.0 m/s vaults over the bar. If the vaulter's horizontal component of velocity over the bar is 1.0 m/s and air resistance is disregarded, how high was the jump?
52. An acrobat on skis starts from rest 50.0 m above the ground on a frictionless track and flies off the track at a 45.0° angle above the horizontal and at a height of 10.0 m. Disregard air resistance.
- What is the skier's speed when leaving the track?
 - What is the maximum height attained?
53. **Figure 5-21** is a graph of the gravitational potential energy and kinetic energy of a 75 g yo-yo as it moves up and down on its string. Use the graph to answer the following questions:
- By what amount does the mechanical energy of the yo-yo change after 6.0 s?
 - What is the speed of the yo-yo after 4.5 s?
 - What is the maximum height of the yo-yo?

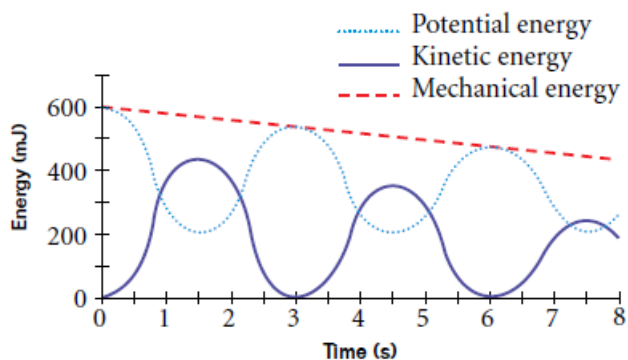


Figure 5-21

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.

61. A 25 kg child on a 2.0 m long swing is released from rest when the swing supports make an angle of 30.0° with the vertical.
- What is the maximum potential energy associated with the child?
 - Disregarding friction, find the child's speed at the lowest position.
 - What is the child's total mechanical energy?
 - If the speed of the child at the lowest position is 2.00 m/s, what is the change in mechanical energy due to friction?

62. A ball of mass 522 g starts at rest and slides down a frictionless track, as shown in **Figure 5-23**. It leaves the track horizontally, striking the ground.
- At what height above the ground does the ball start to move?
 - What is the speed of the ball when it leaves the track?
 - What is the speed of the ball when it hits the ground?

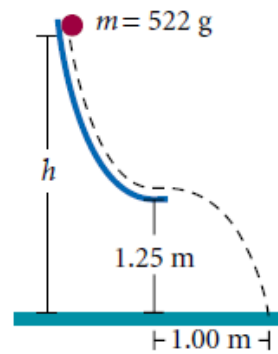


Figure 5-23