CHAPTER 5

2. A very light cart holding a 300-N box is moved at constant velocity across a 15-m level surface. What is the net work done in the process?

    a. zero
    b. 1/20 J
    c. 20 J
    d. 2 000 J

4. An rock is thrown straight up with an initial velocity of 15.0 m/s. Ignore energy lost to air friction. How high will the rock rise?

    a. 1.53 m
    b. 22.9 m
    c. 6.50 m
    d. 11.5 m

6. A professional skier reaches a speed of 56 m/s on a 30° ski slope. Ignoring friction, what was the minimum distance along the slope the skier would have had to travel, starting from rest?

    a. 110 m
    b. 160 m
    c. 320 m
    d. 640 m

7. A 50-N crate is pulled up a 5-m inclined plane by a worker at constant velocity. If the plane is inclined at an angle of 37° to the horizontal and there exists a constant frictional force of 10 N between the crate and the surface, what is the force applied by the worker?

    a. zero
    b. 20 N
    c. 30 N
    d. 40 N

8. Adisa pulls a 40-N crate up a 5.0-m long inclined plane at a constant velocity. If the plane is inclined at an angle of 37° to the horizontal and there is a constant force of friction of 10 N between the crate and the surface, what is the net change in potential energy of the crate?

    a. 120 J
    b. –120 J
    c. 200 J
    d. –200 J

9. A 20-N crate starting at rest slides down a rough 5.0-m long ramp, inclined at 25° with the horizontal. 20 J of energy is lost to friction. What will be the speed of the crate at the bottom of the incline?

    a. 0.98 m/s
    b. 1.9 m/s
    c. 3.2 m/s
    d. 4.7 m/s

13. The rate at which work is done is equivalent to which of the following?

    a. increase in potential energy
    b. thermal energy
    c. potential energy
    d. power

20. A worker pushes a sled with a force of 40 N over a level distance of 6.0 m. If a frictional force of 24 N acts on the wheelbarrow in a direction opposite to that of the worker, what net work is done on the wheelbarrow?

    a. 240 J
    b. 216 J
    c. 144 J
    d. 96 J

22. Preston pushes a wheelbarrow weighing 500 N to the top of a 50.0-m ramp, inclined at 20.0° with the horizontal, and leaves it. Tamara accidentally bumps the wheelbarrow. It slides back down the ramp, during which an 80.0-N frictional force acts on it over the 50.0 m. What is the wheelbarrow's kinetic energy at the bottom at of the ramp? (g = 9.8 m/s^2)

    a. 4 550 J
    b. 6 550 J
    c. 8 150 J
    d. 13 100 J

25. A 10.0-kg box starts at rest and slides 3.5 m down a ramp inclined at an angle of 10° with the horizontal. If there is no friction between the ramp surface and crate, what is the velocity of the crate at the bottom of the ramp? (g = 9.8 m/s^2)

    a. 6.1 m/s
    b. 3.5 m/s
    c. 10.7 m/s
    d. 8.3 m/s

26. A pile driver drives a post into the ground. The mass of the pile driver is 2 500 kg and it is dropped through a height of 8.0 m on each stroke. If the resisting force of the ground is 4.0×10^6 N, how far is the post driven in on each stroke?

    a. 4.9 cm
    b. 9.8 cm
    c. 16 cm
    d. 49 cm

27. A 2 000-kg ore car rolls 50.0 m down a frictionless 10.0° incline. If there is a horizontal spring at the end of the incline, what spring constant is required to stop the ore car in a distance of 1.00 m?

    a. 340 kN/m
    b. 681 kN/m
    c. 980 kN/m
    d. 1 960 kN/m

28. An amount of work equal to 1.5 J is required to compress the spring in a spring-gun. What is the "launch speed" of a 15-g marble?

    a. 14 m/s
    b. 15 m/s
    c. 18 m/s
    d. 21 m/s

31. A horizontal force of 200 N is applied to a 55-kg cart across a 10-m level surface. If the cart accelerates at 2.0 m/s^2, then what force of friction acts to retard the motion of the cart?

    a. 110 N
    b. 90 N
    c. 80 N
    d. 70 N

32. A baseball catcher puts on an exhibition by catching a 0.15-kg ball dropped from a helicopter at a height of 101 m. What is the speed of the ball just before it hits the catcher's glove 1.0 m above the ground? (g = 9.8 m/s^2 and ignore air resistance.)

    a. 44 m/s
    b. 38 m/s
    c. 31 m/s
    d. 22 m/s

33. A baseball catcher puts on an exhibition by catching a 0.150-kg ball dropped from a helicopter at a height of 100 m above the catcher. If the catcher "gives" with the ball for a distance of 0.750 m while catching it, what average force is exerted on the mitt by the ball? (g = 9.80 m/s^2)

    a. 78 N
    b. 119 N
    c. 196 N
    d. 392 N

34. A simple pendulum, 1.00 m in length, is released from rest when the support string is at an angle of 35.0° from the vertical. What is the speed of the suspended mass at the bottom of the swing? (Ignore air resistance, $g = 9.80$ m/s^2)

    a. 0.67 m/s
    b. 0.94 m/s
    c. 1.33 m/s
    d. 1.88 m/s

35. A simple pendulum, 2.0 m in length, is released with a push when the support string is at an angle of 25° from the vertical. If the initial speed of the suspended mass is 1.2 m/s when at the release point, what is its speed at the bottom of the swing? ($g = 9.8$ m/s^2)

    a. 2.3 m/s
    b. 2.6 m/s
    c. 2.0 m/s
    d. 0.5 m/s

36. A simple pendulum, 2.0 m in length, is released by a push when the support string is at an angle of 25° from the vertical. If the initial speed of the suspended mass is 1.2 m/s when at the release point, to what maximum angle will it move in the second half of its swing?

    a. 37°
    b. 30°
    c. 27°
    d. 21°

41. A golf ball hits a wall and bounces back at 3/4 the original speed. What part of the original kinetic energy of the ball did it lose in the collision?

    a. 1/4
    b. 3/8
    c. 7/16
    d. 9/16

42. If both mass and velocity of a ball are tripled, the kinetic energy is increased by a factor of:

    a. 3
    b. 6
    c. 9
    d. 27

46. A girl and her bicycle have a total mass of 40.0 kg. At the top of the hill her speed is 5.0 m/s and her speed doubles as she rides down the hill. The hill is 10.0 m high and 100 m long. How much kinetic energy and potential energy is lost to friction?

    a. 2 420 J
    b. 1 500 J
    c. 2 000 J
    d. 3 920 J

47. A girl and her bicycle have a total mass of 40 kg. At the top of the hill her speed is 5.0 m/s. The hill is 10 m high and 100 m long. If the force of friction as she rides down the hill is 20 N, what is her speed at the bottom?

    a. 5.0 m/s
    b. 10 m/s
    c. 11 m/s
    d. She stops before she reaches the bottom.

48. Old Faithful geyser in Yellowstone Park shoots water hourly to a height of 40 m. With what velocity does the water leave the ground?

    a. 7.0 m/s
    b. 14 m/s
    c. 20 m/s
    d. 28 m/s

50. A 1 200-kg automobile moving at 25 m/s has the brakes applied with a deceleration of 8.0 m/s^2. How far does the car travel before it stops?

    a. 39 m
    b. 47 m
    c. 55 m
    d. 63 m

54. A speed boat requires 80 kW to move at a constant speed of 15 m/s. What is the resistive force of the water at this speed?

    a. 2 700 N
    b. 5 300 N
    c. 6 500 N
    d. 7 700 N

55. A pole vaulter clears 6.00 m. With what speed does he strike the mat in the landing area?

    a. 2.70 m/s
    b. 5.40 m/s
    c. 10.8 m/s
    d. 21.6 m/s

56. A parachutist of mass 50.0 kg jumps out of an airplane at a height of 1 000 m. The parachute deploys, and she lands on the ground with a speed of 5.0 m/s. How much energy was lost to air friction during this jump?

    a. 49 400 J
    b. 98 700 J
    c. 198 000 J
    d. 489 000 J

61. A satellite is held in orbit by a 2 000-N gravitational force. Each time the satellite completes an orbit of circumference 80 000 km, the work done on it by gravity is

    a. 1.6×10^8 J
    b. 1.6×10^{11} J
    c. 6.4×10^{11} J
    d. 0

65. A 100-W light bulb is left on for 10.0 hours. Over this period of time, how much energy was used by the bulb?

    a. 1 000 J
    b. 3 600 J
    c. 3 600 000 J
    d. 1.34 hp

CHAPTER 5 - ANSWERS

#	Ans	Difficulty	#	Ans	Difficulty
1.	C	1	34.	D	2
2.	A	1	35.	A	2
3.	D	1	36.	B	2
4.	D	2	37.	C	2
5.	A	2	38.	D	2
6.	C	2	39.	D	2
7.	D	2	40.	C	1
8.	A	2	41.	C	1
9.	D	2	42.	D	1
10.	C	1	43.	A	1
11.	D	1	44.	C	2
12.	A	1	45.	C	1
13.	D	1	46.	A	2
14.	D	1	47.	C	2
15.	B	1	48.	D	3
16.	D	1	49.	D	2
17.	D	1	50.	A	2
18.	B	1	51.	A	2
19.	C	1	52.	B	2
20.	D	1	53.	C	2
21.	D	1	54.	B	2
22.	A	2	55.	C	2
23.	C	1	56.	D	2
24.	D	1	57.	A	3
25.	B	2	58.	C	3
26.	A	2	59.	D	2
27.	A	1	60.	C	2
28.	A	2	61.	D	2
29.	B	2	62.	C	2
30.	C	1	63.	A	3
31.	B	2	64.	B	2
32.	A	2	65.	C	2
33.	C	2	66.	C	1