1. Which of the following forms of mechanical energy is associated with an object due to its position and gravity?
   A) potential
   B) total
   C) positional
   D) kinetic

2. Which of the following forms of mechanical energy is lost by an object that is slowing down?
   A) non-mechanical energy
   B) gravitational potential energy
   C) elastic potential energy
   D) kinetic energy

3. Which of the following is the rate at which energy is transferred?
   A) potential energy
   B) mechanical energy
   C) kinetic energy
   D) power

4. Which of these would most increase the kinetic energy of a moving car?
   A) double the mass of the car
   B) divide the mass of the car by 2
   C) double the speed of the car
   D) divide the speed of the car by 2

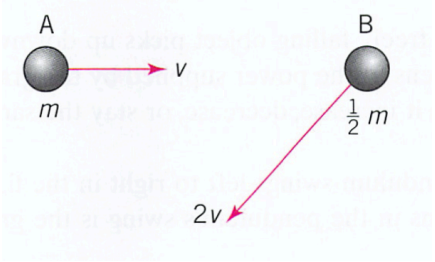
5. A cashier pushes a grocery cart 5.0 m with a horizontal force of 50.0 N. How much work is done by the cashier on the grocery cart?
   A) 10 J
   B) 250 J
   C) 1250 J
   D) 55 J

6. A 50 kg pole vaulter clears a bar that is 6.00 m above the ground. With what velocity does the vaulter strike the mat in the landing area?
   A) 2.70 m/s
   B) 10.8 m/s
   C) 5.40 m/s
   D) 21.6 m/s

7. A 125 kg bobsled zips down an ice track starting at a vertical distance of 150 m up the hill. Disregarding friction, what is the velocity of the bobsled at the bottom of the hill?
   A) 27 m/s
   B) 45 m/s
   C) 36 m/s
   D) 54 m/s

8. Water flows over a section of Niagara Falls at a rate of 1.20×10^6 kg/s and falls down a height of 50.0 m. What is the power of the waterfall?
   A) 589 MW
   B) 147 MW
   C) 294 MW
   D) 60.0 MW

9. Which (if either) of the two objects shown has the greatest kinetic energy? Does it matter in which direction the objects are moving?
   A) A
   B) B
   C) The same amount
   D) Not enough to know



Work

10. A girl pulls a wagon along a level path for a distance of 15.0 m. The handle of the wagon makes an angle of 20.0° with the horizontal, and the girl exerts a force of 35.0 N on the handle. Find the work that she done on the wagon.

11. At the 1996 Summer Olympics in Atlanta, Georgia, a mass of 260 kg was lifted for the first time ever in a clean-and-jerk lift. The lift, performed by Russian weightlifter Andrei Chemerkin, earned him the unofficial title as "the world's strongest man." If Chemerkin did 6210 J of work in exerting a force of 2590 N, how high did he lift the mass?

12. The stair stepper is a novel exercise machine that attempts to reproduce the work done against gravity by walking up stairs. With each step, Brad (60 kg) simulates stepping up a distance of 0.2 meters with this machine. If Brad exercises for 15 minutes a day with a stair stepper at a frequency of 60 steps per minute, what is the total work done by Brad each day?

Kinetic Energy

13. Although ungraceful on land, walruses are fine swimmers. They normally swim at 7 km/h, and for short periods of time are capable of reaching speeds of nearly 35 km/h. If a walrus swimming at a speed of 35.0 km/h has a mass of 900 kg, what is its kinetic energy?

14. Though slow on land, the leatherback turtle holds the record for the fastest water speed of any reptile: 9.78 m/s. It is also among the largest of reptiles. Suppose the largest leatherback yet discovered were to swim at the top leatherback speed. If its kinetic energy was 6.08×10^4 J, what was its mass?

15. The kinetic energy of a golf ball is measured to be 1433 J. If the golf ball has a mass of about 47.0 g, what is the ball's speed?

Potential Energy

16. In 1992, Ukrainian Sergei Bubka used a short pole to jump to a height of 6.13 m. If the maximum potential energy associated with Bubka was 4.80 kJ at the midpoint of his jump, what was his mass?

17. Situated 4080 m above sea level, La Paz, Bolivia, is the highest capital in the world. If a car with a mass of 905 kg is driven to La Paz from a location that is 1860 m above sea level, what is the increase in potential energy?

18. A 110-kg football player does a chin-up by pulling himself up by his arms an additional height of 50.0 cm above the floor. If he does a total of 25 chin-ups, how much work does he do?

Power

19. Calculate the amount of energy produced in joules by a 100-watt lightbulb lit for 2.5 hours.

20. A consumer's electric bill indicates that they have used a total of 793 kWh of electricity for a 30-day period. Express this energy in joules

Conservation of Energy

21. You throw a softball (250 g) straight up into the air. It reaches a maximum altitude of 15 meters and then returns to you. (Assume the ball departed from and returned to ground level.)

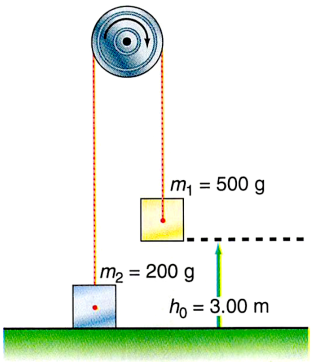
    A) What is the gravitational potential energy (in joules) of the softball at its highest position?

    B) What is the kinetic energy of the softball as soon as it leaves your hand? (Assume that there are no energy losses by the softball while it is in the air.)

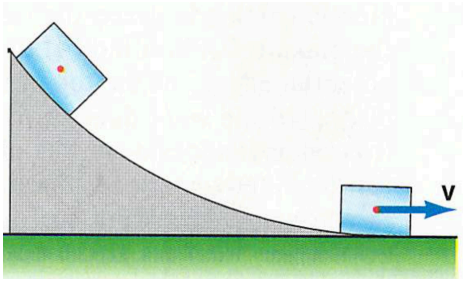
    C) What is the kinetic energy of the softball when it returns to your hand?

    D) From the kinetic energy, calculate the velocity of the ball.

22. What is the total energy of the Atwood's machine in the position shown in the diagram? If the blocks are released and m_1 falls through a distance of 1.00 m, what is the kinetic and potential energy of each block, and what are their velocities?

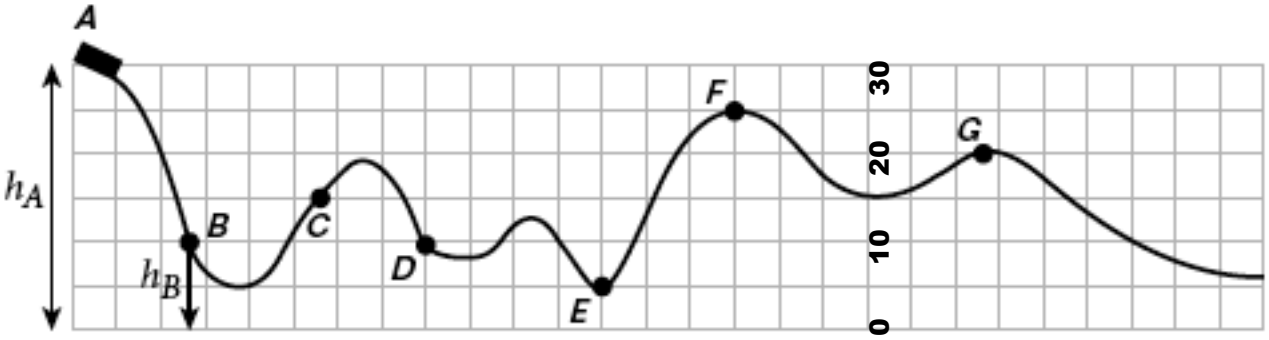


23. A 6.68-kg package slides from rest down a portion of a circular mail chute that is 4.58 m above the ground. Its velocity at the bottom is 7.63 m/s. How much energy is lost due to friction?



24. A projectile is fired vertically with an initial velocity of 125 m/s. Using the law of conservation of energy, find how high the projectile rises.

25. The rolling car has a mass of 700 kg, and starts from a height of 30 m. Complete the table below.



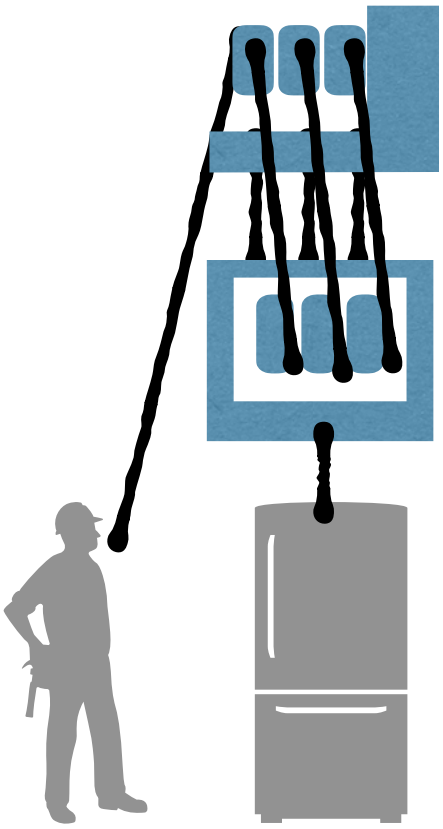
	Height	PE	KE	TE	V
A	30				8 m/s
B	10				
D	10				
F	25				

26. At the end of the ride, a breaking system stops the car (height of 5m). How much work is done by the breaks to stop the car?

27. If the breaks stop the car over a 15 m distance, what is the average force of the breaks?

Name _____ Energy and Power

28. Scott uses a pulley system of 6 ropes as shown. He lifts the 2000 N refrigerator up a distance of 2 m, using a force of 400 N. He does the job in 75 seconds.



a. How far down does he pull his side of the ropes?

b. What is the work input?

c. What is the work output?

d. What is the IMA

e. What is the AMA

f. What is the efficiency of the system?

g. What is his power?