Practice Problems

1. Which of the following is an example of kinetic energy?
   (A) A child jumping rope.
   B. A swimmer ready to dive.
   C. A toy lying on a table
   D. Firewood stacked in a fireplace.

2. In which situation is potential energy increasing?
   (A) Pulling a wagon up a hill.
   B. Emptying a bucket of water.
   C. A cat jumping down from a tree.
   D. A car stopping at the traffic signal.

3. A pitcher throws a baseball. Which object has the most kinetic energy?
   A. The pitcher. B. The catcher C. The batter (D) The baseball

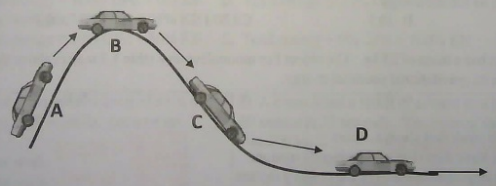
4. A man has a mass of 130 kg. He stands atop a cliff 100 meters above the valley floor. Calculate his gravitational potential energy.
   A. 1.3 J B. 1300 J C. 13,000 J (D) 130,000 J

5. All objects that have kinetic energy must be
   A. Motionless B. Rolling C. Performing work (D) Moving

6. A hammer has a mass of 0.50 kg. The hammer falls to the floor with a speed of 10 m/s. Calculate the kinetic energy of the hammer.
   A. 2.5 J B. 5.0 J (C) 25 J D. 50 J

7. See the diagram below. At which position does the car have the greatest potential energy?
   A. Position A (B) Position B C. Position C D. Position D

8. See the diagram below. At which position does the car probably have the greatest kinetic energy?
   A. Position A B. Position B C. Position C (D) Position D



9. You hold a 5.0 kg object in your hand. You hold the object exactly 1 meter above the ground. How much work are you performing on the object at that instant in time?
   (A) 0 J B. 5.0 J C. 50.0 J D. 500 J

10. Jerry pushes a wagon with a force of 70 N for a distance of 30 meters in 30 seconds. Teddy pushes a wagon with a force of 70 N for a distance of 30 meters in 40 seconds.
A. Jerry performed more work and used more power than Teddy.
B. Teddy performed more work and used more power than Jerry.
C. Jerry and Teddy performed equal work, but Jerry used more power.
D. Jerry and Teddy performed equal work, but Teddy used more power.
E. Jerry and Teddy performed equal work and used equal power.

11. Jerry pushes a wagon with a force of 80 N for a distance of 30 meters in 30 seconds. Teddy pushes a wagon with a force of 40 N for a distance of 60 meters in 30 seconds.
A. Jerry performed more work and used more power than Teddy.
B. Teddy performed more work and used more power than Jerry.
C. Jerry and Teddy performed equal work, but Jerry used more power.
D. Jerry and Teddy performed equal work, but Teddy used more power.
E. Jerry and Teddy performed equal work and used equal power.

12. Jerry pushes a wagon with a force of 80 N for a distance of 30 meters in 30 seconds. Teddy pushes a wagon with a force of 60 N for 30 meters in 30 seconds.
A. Jerry performed more work and used more power than Teddy.
B. Jerry performed more work and used less power than Teddy.
C. Jerry and Teddy performed equal work, but Jerry used more power.
D. Jerry and Teddy performed equal work, but Teddy used more power.
E. Jerry and Teddy performed equal work and used equal power.

13. The total energy attributed to an object (e.g., the system) may be transformed from one type of energy to another type of energy, but no energy is lost or gained.
A. Never true B. Sometimes true C. Always true D. It may happen if work occurs.

14. An object has a mass of 25 kg. The object lies motionless on a table 1.2 meters above the floor. Calculate its kinetic energy.
A. 0 J B. 18 J C. 30 J D. 300 J

15. An object has a mass of 25 kg. The object lies motionless on a table 1.2 meters above the floor. Calculate its gravitational potential energy.
A. 0 J A. 0 J A. 0 J A. 0 J

16. Friction is work that always occurs _____ .
A. In the same direction as the object's motion.
B. In the opposite direction of the object's motion.
C. Both in the same direction and in the opposite direction.
D. Depends on which type of object is in motion.

17. An object freefalls. What is causing work to be performed upon the object?
A. Gravity B. Mass of the object C. Air resistance D. Wind

18. If you stretch a spring, _____ produces _____.
A. Work against gravity; gravitational potential energy
(B) Work against resistance; elastic potential energy
C. Mechanical work; kinetic energy
D. Work against shape; chemical energy

19. If you lift an object, _____ produces _____.
(A) Work against gravity; gravitational potential energy
B. Work against resistance; elastic potential energy
C. Mechanical work; kinetic energy
D. Work against shape; chemical energy

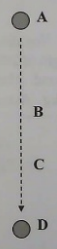
20. According to the work-energy theorem…
(A) All types of work will produce energy; all types of energy can produce work.
B. All types of work will produce energy; energy cannot produce work.
C. All types of energy will produce work; work cannot produce energy
D. Energy cannot produce work; work cannot produce energy.

21. According to the Law of Conservation of Energy…
A. Energy can be converted into work.
B. Work can be converted into energy.
(C) Energy is neither gained nor destroyed.
D. The total energy is slowly decreases.

22. What best describes the energy relationship at position A?
(A) Total energy = 100% GPE + 0% KE
B. Total energy = 75% GPE + 25% KE
C. Total energy = 50% GPE + 50% KE
D. Total energy = 25% GPE + 75% KE
E. Total energy = 0% GPE + 100% KE

23. What best describes the energy relationship at position C?
A. Total energy = 100% GPE + 0% KE
B. Total energy = 75% GPE + 25% KE
C. Total energy = 50% GPE + 50% KE
(D) Total energy = 25% GPE + 75% KE
E. Total energy = 0% GPE + 100% KE

24. What best describes the energy relationship at position B?
A. Total energy = 100% GPE + 0% KE
B. Total energy = 75% GPE + 25% KE
(C) Total energy = 50% GPE + 50% KE
D. Total energy = 25% GPE + 75% KE
E. Total energy = 0% GPE + 100% KE



1. James pushed a crate with a force of 30 N for a distance of 30 m in 20 seconds. (assume no friction).	2. A crane lifted a block of cement to a height of 80 meters in 75 seconds. The mass of the block was 300 kg.
• Calculate work. (30)(30) = 900 J	• Calculate work. (300)(9.81)(80) = 240,000 J
• Calculate power. 900/20 = 45 W	• Calculate power. 240,000/75 = 3200 W

25. A rocket behaves like a vertical projectile. A rocket blasts off from the launch pad. The mass of the rocket is 50 kg. Assume no mass change. The launch velocity is 80 m/s.

TOTAL ENERGY =	160,000 J
GPE at 0 m (launch) =	0 J
KE at 0 m (launch)	160,000 J
GPE at maximum height =	160,000 J
KE at maximum height =	0 J
Maximum height =	326 m
GPE at 200 m above ground =	98,000 J
KE at 200 m above ground =	62,000 J
Velocity at 200 m above ground =	50 m/s

26. You drop a rock from a height of 200 m. It impacts the ground. The mass of the rock is 40 kg. Assume no mass change.

TOTAL ENERGY =	78,000 J
GPE at 200 m (release) =	78,000 J
KE at 200 m (release)	0 J
GPE at 120 m =	47,000 J
KE at 120 m =	31,000 J
Velocity at 120 m =	39 m/s
GPE at impact =	0 J
KE at impact =	78,000 J
Velocity at impact =	62 m/s