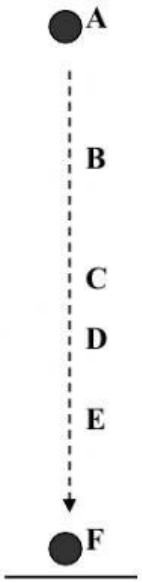
Name: _____ Date: _____

Work, Power, & Energy
Law of Conservation of Energy

According to the law of conservation of energy, "In a closed system, the total energy of an object remains constant (TOT E never changes), however the types of energy can change—one form of energy can be transformed into other forms of energy". In the following scenarios, gravity is affecting the moving objects and friction is zero. TOT E remains constant but the proportions of GPE and KE change.

- Total Energy = Gravitational Potential Energy + Kinetic Energy = 100%
- The percentage of GPE and KE can change as object moves down or up, but the total energy remains constant.
- Assume no friction (loss of energy by heat)



1. Conservation of Energy of a Freefalling Object. A ball is initially suspended above the ground at position A. The ball is released, it freefalls from position A to position F. At position F, the ball impacts the ground. Answer the questions about the conversion of GPE to KE as the ball freefalls to the ground. Air resistance is absent. Choose the best answer that describes the energy relationship of the falling ball.

_____ 1. At Position A

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 2. At Position B

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 3. At Position C

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 4. At Position D

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

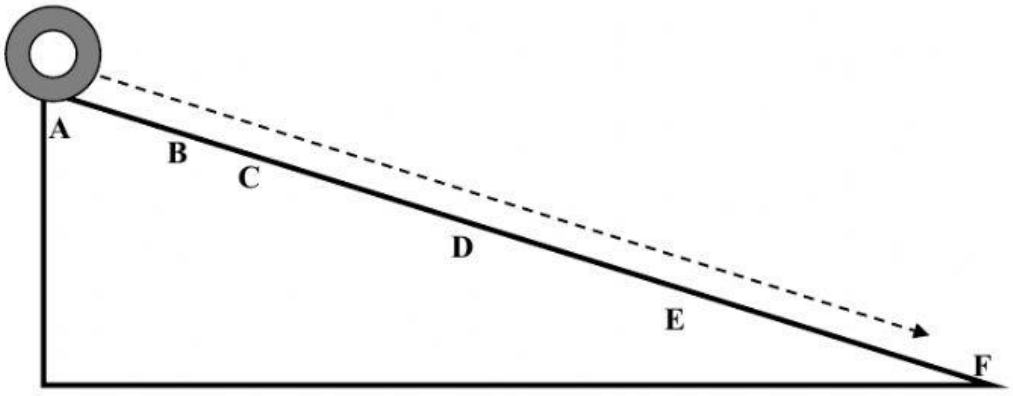
_____ 5. At Position E

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 6. At Position F

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

2. Energy on an Incline Plane. A wheel is placed at A, at the top of an incline plane. The wheel is released and it **rolls** down the incline plane from position A to position F at the bottom of the incline. Answer the questions about the conversion of GPE to KE as the ball freefalls to the ground. Friction is negligible. Choose the best answer that describes the energy relationship of the moving wheel.



_____ 7. At Position A

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 8. At Position B

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 9. At Position C

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 10. At Position D

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

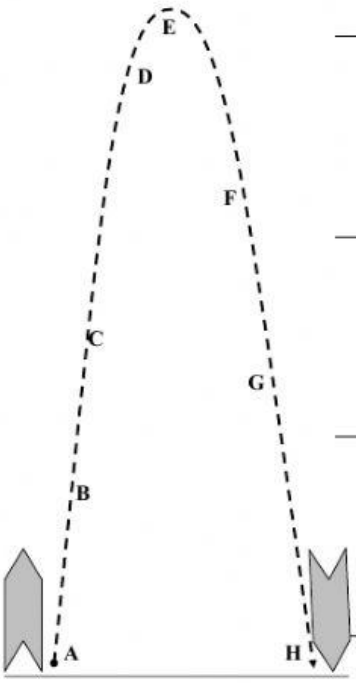
_____ 11. At Position E

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 12. At Position F

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

3. Energy of a Vertical Projectile. A rocket is launched from position A with vertical projectile motion. It travels the path indicated by the dashed line. It impacts the ground at position H. Choose the best answer that describes the energy relationship of the rocket.



_____ 13. At Position A
A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 14. At Position B
A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 15. At Position C
A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 16. At Position D
A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

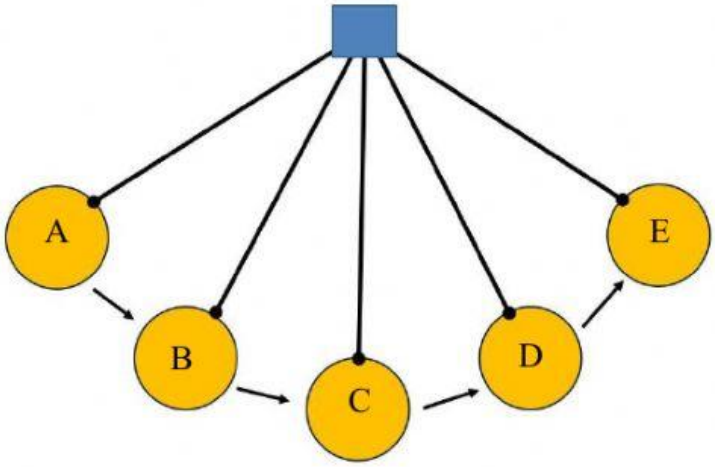
_____ 17. At Position E
A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 18. At Position F
A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 19. At Position G
A. 100% GPE + 0 KE
B. 0 GPE + 100 % KE
C. 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE

_____ 20. At position H

A. 100% GPE + 0 KE
B. 0 GPE + 100 % KE
C. 50% GPE + 50% KE
D. GPE > KE
E. GPE < KE



4. Energy of a Pendulum. Starting from rest, the pendulum swings from position A to position E.

Choose the best answer that describes the energy of the pendulum. The height of the pendulum is measured at the bottom of the bob.

_____ 21. At Position A

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. TOT E = 75% GPE + 25% KE
E. TOT E = 25% GPE + 75% KE

_____ 22. At Position B

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. TOT E = 75% GPE + 25% KE
E. TOT E = 25% GPE + 75% KE

_____ 23. At Position C

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. TOT E = 75% GPE + 25% KE
E. TOT E = 25% GPE + 75% KE

_____ 24. At Position D

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. TOT E = 75% GPE + 25% KE
E. TOT E = 25% GPE + 75% KE

_____ 25. At Position E

A. TOT E = 100% GPE + 0 KE
B. TOT E = 0 GPE + 100 % KE
C. TOT E = 50% GPE + 50% KE
D. TOT E = 75% GPE + 25% KE
E. TOT E = 25% GPE + 75% KE