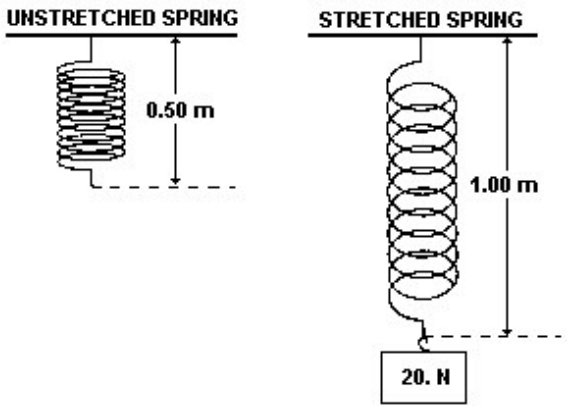
Name: _____

1. A 20.-newton weight is attached to a spring, causing it to stretch, as shown in the diagram.



What is the spring constant of this spring?

A. 0.050 N/m
B. 0.25 N/m
C. 20. N/m
D. 40. N/m

2. The kinetic energy of a 980-kilogram race car traveling at 90. meters per second is approximately

A. 4.4×10^4 J
B. 8.8×10^4 J
C. 4.0×10^6 J
D. 7.9×10^6 J

3. An object 10 meters above the ground has Z joules of potential energy. If the object falls freely, how many joules of kinetic energy will it have gained when it is 5 meters above the ground?

A. Z
B. 2Z
C. Z/2
D. 0

4. A person does 100 joules of work in pulling back the string of a bow. What will be the initial speed of a 0.5-kilogram arrow when it is fired from the bow?

A. 20 m/s
B. 50 m/s
C. 200 m/s
D. 400 m/s

5. An object with a speed of 20. meters per second has a kinetic energy of 400. joules. The mass of the object is

A. 1.0 kg
B. 2.0 kg
C. 0.50 kg
D. 40. kg

6. A basketball player who weighs 600 newtons jumps 0.5 meter off the floor. What is her kinetic energy just before hitting the floor?

A. 30 J
B. 60 J
C. 300 J
D. 600 J

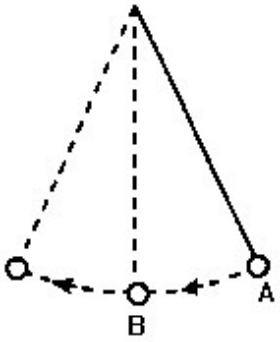
7. An object moving at a constant speed of 25 meters per second possesses 450 joules of kinetic energy. What is the object's mass?

A. 0.72 kg
B. 1.4 kg
C. 18 kg
D. 36 kg

8. An object gains 10. joules of potential energy as it is lifted vertically 2.0 meters. If a second object with one-half the mass is lifted vertically 2.0 meters, the potential energy gained by the second object will be

A. 10. J
B. 20. J
C. 5.0 J
D. 2.5 J

9. In the diagram, an ideal pendulum released from point *A* swings freely through point *B* .



Compared to the pendulum's kinetic energy at *A*, its potential energy at *B* is

A. half as great
B. twice as great
C. the same
D. four times as great

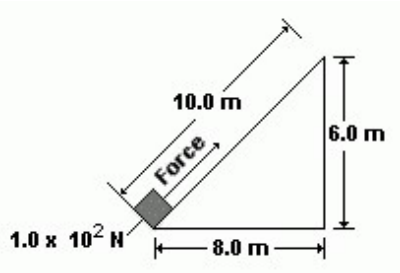
10. A force of 0.2 newton is needed to compress a spring a distance of 0.02 meter. The potential energy stored in this compressed spring is

A. 8×10^{-5} J
B. 2×10^{-3} J
C. 2×10^{-5} J
D. 4×10^{-3} J

11. The diagram below shows a moving, 5.00-kilogram cart at the foot of a hill 10.0 meters high. For the cart to reach the top of the hill, what is the minimum kinetic energy of the cart in the position shown? [Neglect energy loss due to friction.]

A. 4.91 J
B. 50.0 J
C. 250. J
D. 491 J

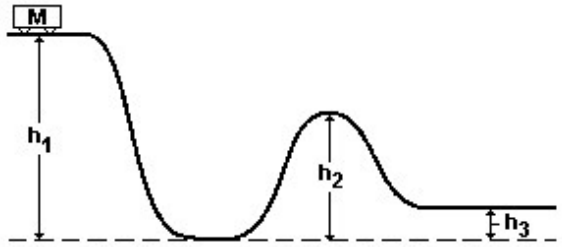
12. A box weighing 1.0×10^2 newtons is dragged to the top of an incline, as shown in the diagram.



The gravitational potential energy of the box at the top of the incline is approximately

A. 1.0×10^2 J
B. 6.0×10^2 J
C. 8.0×10^2 J
D. 1.0×10^3 J

13. A cart of mass *M* on a frictionless track starts from rest at the top of a hill having height h_1, as shown in the diagram below.



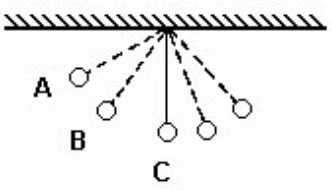
What is the kinetic energy of the cart when it reaches the top of the next hill, having height h_2?

A. Mgh_1
B. $Mg(h_1 - h_2)$
C. $Mg(h_2 - h_3)$
D. 0

14. As an object falls freely near the Earth's surface, the loss in gravitational potential energy of the object is equal to its

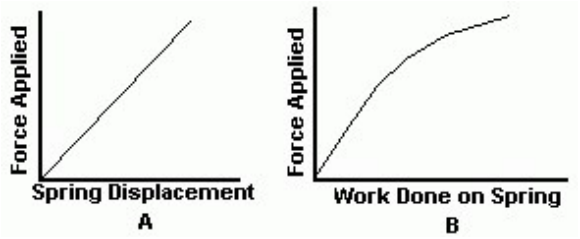
A. loss of height
B. loss of mass
C. gain in velocity
D. gain in kinetic energy

15. As the pendulum swings from position *A* to position *C* as shown in the diagram below, what is the relationship of kinetic energy to potential energy? [Neglect friction.]



A. The kinetic energy decreases more than the potential energy increases.
B. The kinetic energy increases more than the potential energy decreases.
C. The kinetic energy decrease is equal to the potential energy increase.
D. The kinetic energy increase is equal to the potential energy decrease.

16. Graphs *A* and *B* represent the results of applying an increasing force to stretch a spring which did not exceed its elastic limit.



The spring constant can be represented by the

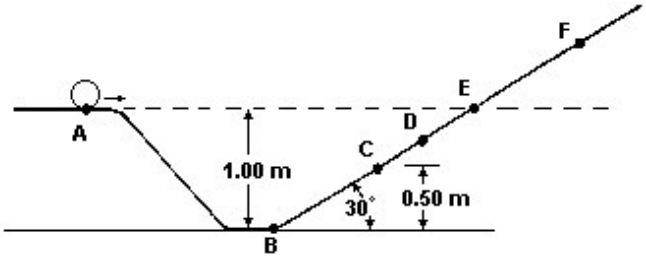
A. slope of graph *A*
B. slope of graph *B*
C. reciprocal of the slope of graph *A*
D. reciprocal of the slope of graph *B*

17. A spring of negligible mass with a spring constant of 200 newtons per meter is stretched 0.2 meter. How much potential energy is stored in the spring?

A. 40 J
B. 20 J
C. 8 J
D. 4 J

Figure 1

The diagram represents a 0.20-kilogram sphere moving to the right along a section of a frictionless surface. The speed of the sphere at point *A* is 3.0 meters per second.



18. **[Refer to figure 1]**
At point *A* the kinetic energy of the sphere is

A. 0.15 J
B. 0.30 J
C. 0.90 J
D. 1.8 J

19. A constant force is used to keep a block sliding at constant velocity along a rough horizontal track. As the block slides, there could be an increase in its

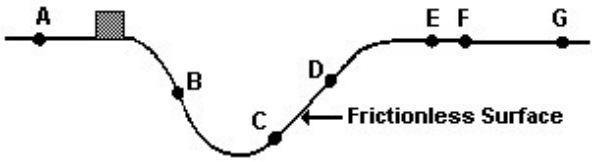
A. gravitational potential energy, only
B. internal energy, only
C. gravitational potential energy and kinetic energy
D. internal energy and kinetic energy

20. A 20.-kilogram object strikes the ground with 1960 joules of kinetic energy after falling freely from rest. How far above the ground was the object when it was released?

A. 10. m
B. 14 m
C. 98 m
D. 200 m

Figure 2

The diagram represents a block sliding along a frictionless surface between points *A* and *G*.



21. **[Refer to figure 2]**
As the block moves from point *A* to point *B*, the speed of the block will be

A. decreasing
B. increasing
C. constant, but not zero
D. zero

22. A 60.-kilogram student running at 3.0 meters per second has a kinetic energy of

A. 180 J
B. 270 J
C. 540 J
D. 8100 J

23. A 0.10-kilogram ball dropped vertically from a height of 1.0 meter above the floor bounces back to a height of 0.80 meter. The mechanical energy lost by the ball as it bounces is approximately

A. 0.080 J
B. 0.20 J
C. 0.30 J
D. 0.78 J

24. As the speed of a bicycle moving along a horizontal surface increases from 2 meters per second to 4 meters per second, the magnitude of the bicycle's gravitational potential energy

A. decreases
B. increases
C. remains the same

25. If the speed of an object is doubled, its kinetic energy will be

A. halved
B. doubled
C. quartered
D. quadrupled