Name _____

Mrs. Jablonowski

Review

Energy, Work + Power #1

1 When a spring is stretched 0.200 meter from its equilibrium position, it possesses a potential energy of 10.0 joules. What is the spring constant for this spring?

(1) 100. N/m
(2) 125 N/m
(3) 250. N/m
(4) 500. N/m

2 A 1.0×10^3-kilogram car is moving at a constant speed of 4.0 meters per second. What is the kinetic energy of the car?

(1) 1.6×10^3 J
(2) 2.0×10^4 J
(3) 8.0×10^3 J
(4) 4.0×10^3 J

3 A force is applied to a block, causing it to accelerate along a horizontal, frictionless surface. The energy gained by the block is equal to the

1 work done on the block
2 power applied to the block
3 impulse applied to the block
4 momentum given to the block

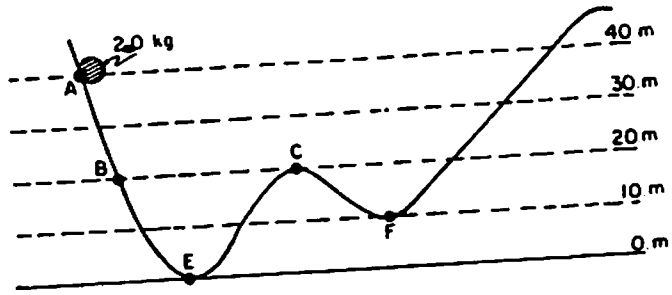
4 A 1.0-kilogram mass gains kinetic energy as it falls freely from rest a vertical distance, d. How far would a 2.0-kilogram mass have to fall freely from rest to gain the same amount of kinetic energy?

(1) d
(2) $2d$
(3) $\frac{d}{2}$
(4) $\frac{d}{4}$

5 A mass resting on a shelf 10.0 meters above the floor has a gravitational potential energy of 980. joules with respect to the floor. The mass is moved to a shelf 8.00 meters above the floor. What is the new gravitational potential energy of the mass?

(1) 960. J
(2) 784 J
(3) 490. J
(4) 196 J

Base your answers to questions 6 through 10 on the diagram below which represents a 2.0-kilogram mass placed on a frictionless track at point A and released from rest. Assume the gravitational potential energy of the system to be zero at point E.



6. The gravitational potential energy of the system at point A is approximately

(1) 80. joules
(2) 20. joules
(3) 8.0×10^0 joules
(4) 7.0×10^0 joules

7. Compared to the kinetic energy of the mass at point B, the kinetic energy of the mass at point E is

(1) ½ as great
(2) twice as great
(3) the same
(4) 4 times greater

8. As the mass travels along the track, the maximum height it will reach above point E will be closest to

(1) 10. m
(2) 20. m
(3) 30. m
(4) 40. m

9. If the mass were released from rest at point B, its speed at point C would be

(1) 0 m/sec
(2) 0.50 m/sec
(3) 10. m/sec
(4) 14 m/sec

Note that question 70 has only three choices.

10. Compared to the total mechanical energy of the system at point A, the total mechanical energy of the system at point F is

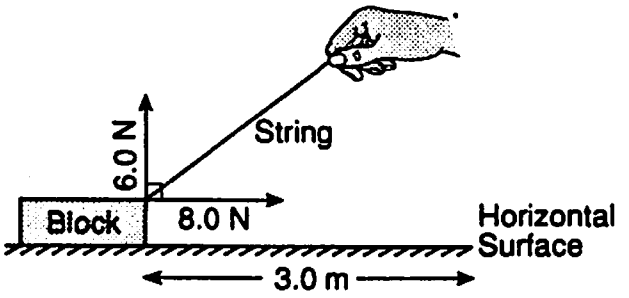
(1) less
(2) more
(3) the same

11. A force of 80. newtons pushes a 50.-kilogram object across a level floor for 8.0 meters. The work done is

(1) 10 joules
(2) 400 joules
(3) 640 joules
(4) 3,920 joules

EWT #2

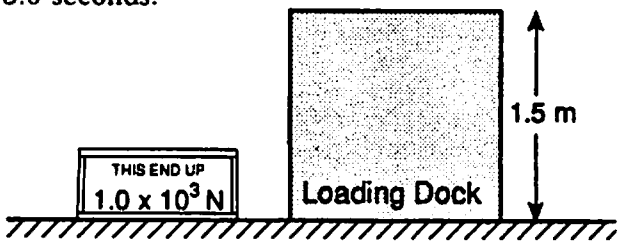
12 A student pulls a block 3.0 meters along a horizontal surface at constant velocity. The diagram below shows the components of the force exerted on the block by the student.



How much work is done against friction?

(1) 18 J
(2) 24 J
(3) 30. J
(4) 42 J

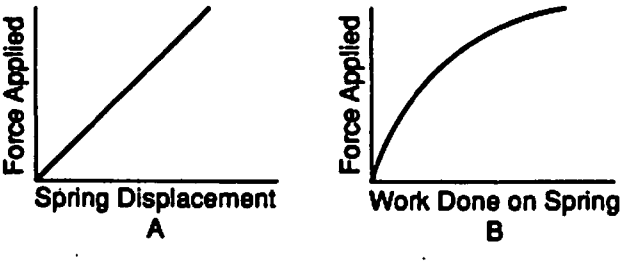
13 The diagram below shows a 1.0×10^3-newton crate to be lifted at constant speed from the ground to a loading dock 1.5 meters high in 5.0 seconds.



What power is required to lift the crate?

(1) 1.5×10^3 W
(2) 2.0×10^2 W
(3) 3.0×10^2 W
(4) 7.5×10^3 W

14 Graphs *A* and *B* below 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

1 slope of graph *A*
2 slope of graph *B*
3 reciprocal of the slope of graph *A*
4 reciprocal of the slope of graph *B*

15 How much work is done on a downhill skier by an average braking force of 9.8×10^2 newtons to stop her in a distance of 10. meters?

(1) 1.0×10^1 J
(2) 9.8×10^1 J
(3) 1.0×10^3 J
(4) 9.8×10^3 J

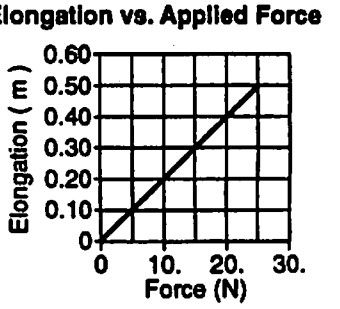
16 Which variable expression is paired with a corresponding unit?

(1) $\frac{\text{mass} \cdot \text{distance}}{\text{time}}$ and watt
(2) $\frac{\text{mass} \cdot \text{distance}^2}{\text{time}}$ and watt
(3) $\frac{\text{mass} \cdot \text{distance}^2}{\text{time}^2}$ and joule
(4) $\frac{\text{mass} \cdot \text{distance}}{\text{time}^3}$ and joule

17 A spring has a spring constant of 120 newtons per meter. How much potential energy is stored in the spring as it is stretched 0.20 meter?

(1) 2.4 J
(2) 4.8 J
(3) 12 J
(4) 24 J

18 The graph below shows the relationship between the elongation of a spring and the force applied to the spring causing it to stretch.



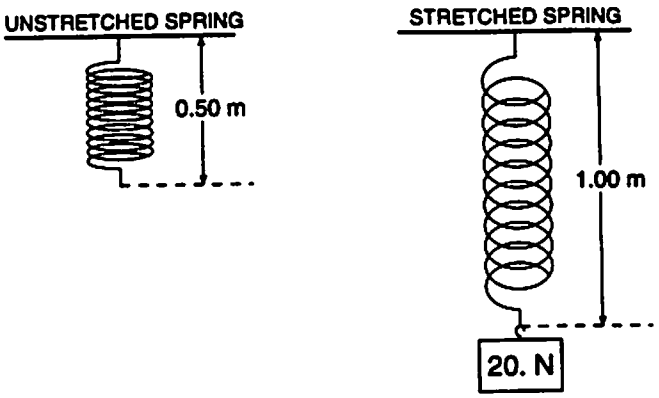
What is the spring constant for this spring?

(1) 0.020 N/m
(2) 2.0 N/m
(3) 25 N/m
(4) 50. N/m

19 As an object is raised above the Earth's surface, the gravitational potential energy of the object-Earth system

1 decreases
2 increases
3 remains the same

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



What is the spring constant of this spring?

(1) 0.050 N/m
(2) 0.25 N/m
(3) 20. N/m
(4) 40. N/m

21 Spring *A* has a spring constant of 140 newtons per meter, and spring *B* has a spring constant of 280 newtons per meter. Both springs are stretched the same distance. Compared to the potential energy stored in spring *A*, the potential energy stored in spring *B* is

1 the same
2 twice as great
3 half as great
4 four times as great

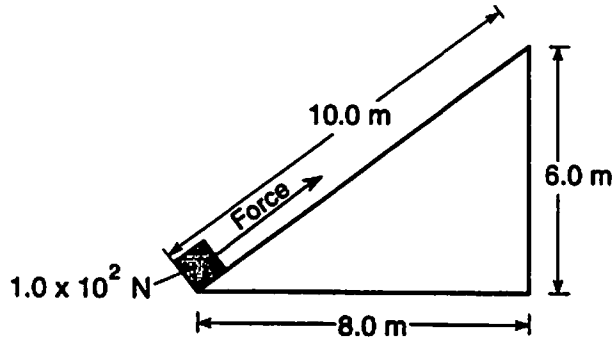
22 A constant force of 2.0 newtons is used to push a 3.0-kilogram mass 4.0 meters across the floor. How much work is done on the mass?

(1) 6.0 J
(2) 8.0 J
(3) 12 J
(4) 24 J

23 A 4.0×10^3-watt motor applies a force of 8.0×10^2 newtons to move a boat at constant speed. How far does the boat move in 16 seconds?

(1) 3.2 m
(2) 5.0 m
(3) 32 m
(4) 80. m

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



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

(1) 1.0×10^2 J
(2) 6.0×10^2 J
(3) 8.0×10^2 J
(4) 1.0×10^3 J

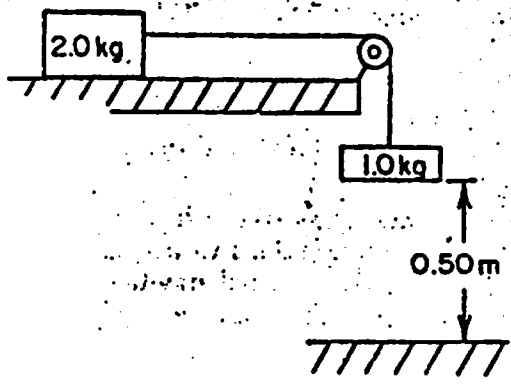
25 A 10.-newton force is required to move a 3.0-kilogram box at constant speed. How much power is required to move the box 8.0 meters in 2.0 seconds?

(1) 40. W
(2) 20. W
(3) 15 W
(4) 12 W

26 The rate of change of work with respect to time is called

1 energy
2 momentum
3 force
4 power

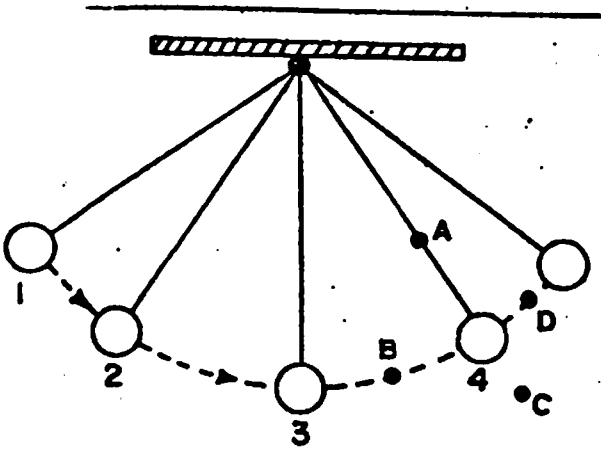
27 A 1.0-kilogram mass falls a distance of 0.50 meter, causing a 2.0-kilogram mass to slide the same distance along a table top, as represented in the diagram below. How much work is done by the falling mass?



(1) 1.5 J
(2) 4.9 J
(3) 9.8 J
(4) 14.7 J

EW+P #4

Base your answers to questions 28 through 32 on the diagram below which represents a simple pendulum with a 2.0-kilogram bob and a length of 10. meters. The pendulum is released from rest at position 1 and swings without friction through position 4. At position 3, its lowest point, the speed of the bob is 6.0 meters per second.



28 At which position does the bob have its maximum kinetic energy?
(1) 1
(2) 2
(3) 3
(4) 4

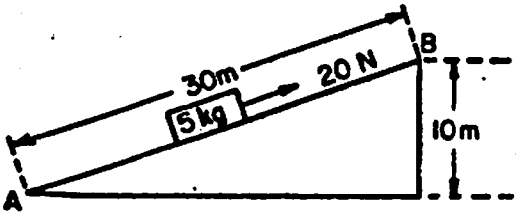
29 What is the potential energy of the bob at position 1 in relation to position 3?
(1) 18 joules
(2) 36 joules
(3) 72 joules
(4) 180 joules

30 At position 4, the centripetal force on the bob is directed toward point
(1) *A*
(2) *B*
(3) *C*
(4) *D*

31 What is the centripetal acceleration of the bob at position 3?
(1) 1.8 m/sec²
(2) 3.6 m/sec²
(3) 7.2 m/sec²
(4) 36 m/sec²

32 Compared to the sum of the kinetic and potential energies of the bob at position 1, the sum of the kinetic and potential energies of the bob at position 2 is
1 less
2 greater
3 the same

Base your answers to questions 33 through 37 on the diagram below which shows a 20-newton force pulling an object up a hill at a constant rate of 2 meters per sec.

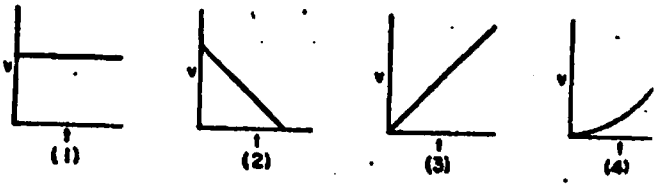


33 The work done by the force in pulling the object from *A* to *B* is
(1) 50 J
(2) 100 J
(3) 500 J
(4) 600 J

34 The kinetic energy of the moving object is
(1) 5 J
(2) ~~10 J~~
(3) 15 J
(4) 50 J

35 The work done against gravity in moving the object from point *A* to point *B* is approximately
(1) 100 J
(2) 200 J
(3) 500 J
(4) 600 J

36 Which graph best represents the relationship between velocity and time for the object?



37 The magnitude of the momentum of the moving object is
(1) 0 kg·m/s
(2) 10 kg·m/s
(3) 100 kg·m/s
(4) 600 kg·m/s

38 A baseball bat strikes a ball with an average force of 2.0×10^4 newtons. If the bat stays in contact with the ball for a distance of 5.0×10^{-3} meter, what kinetic energy will the ball acquire from the bat?
(1) 1.0×10^2 joules
(2) 2.0×10^2 joules
(3) 2.5×10^1 joules
(4) 4.0×10^2 joules