AP Physics 1 Multiple Choice Questions - Chapter 5

1 Energy is defined as the ability to do or cause _____.

a Momentum
b Work
c Force
d Motion

5.1

2 The SI unit for energy is the _____.

a Newton
b Watt
c Kilogram
d Joule

5.1

3 Which of the following are required for work to be done?

a A Force
b Motion
c Gravity
d Force and Motion Only
e All of the above

5.1

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1 Some students want to calculate the work done by friction as an object with unknown mass moves along a straight line on a rough horizontal surface. The students have a force probe, a meterstick, and a stopwatch. Which of the following will allow the students to take the measurements needed to calculate the work done by friction?

5.2

a Pulling the block at an unknown constant acceleration with the force probe for a measured time
b Pulling the block at an unknown constant speed with the force probe for a measured time
c Pulling the block at an unknown constant acceleration with the force probe for a measured distance
d Pulling the block at an unkonwn constant speed with the force probe for a measured distance

2 The work required to accelerate an object on a frictionless surface from a speed v to a speed $2v$ is

5.2

a Equal to the work required to accelerate the object from $v = 0$ to v
b Twice the work required to accelerate the object from $v = 0$ to v
c Three times the work required to accelerate the object from $v = 0$ to v
d Four times the work required to accelerate the object from $2v$ to $3v$
e Not known without knowledge of the acceleration

3 Bob and Jane are loading identical boxes onto a truck. Bob lifts his box straight up from the ground to the bed of the truck, whereas Jane slides her box up a rough ramp to the truck. Which statement is correct?

5.2

a Bob and Jane do the same amount of work
b Bob does more work than Jane
c Jane does more work than Bob
d None of these statements are necessarily true because the force of friction is not known
e None of these statements are necessarily true because the angle of the incline is not known

4 Mark and David are loading identical cement blocks onto David's pickup truck. Mark lifts his block straight up from the ground to the truck, whereas David slides his block up a ramp on massless, frictionless rollers. Which of the following statements is true?

a Mark does more work than David
b Mark and David do the same amount of work
c David does more work than Mark
d None of these statements is necessarily true because the angle of the incline is unknown
e None of these statements is necessaryily true because the mass of one block is not given

5.2

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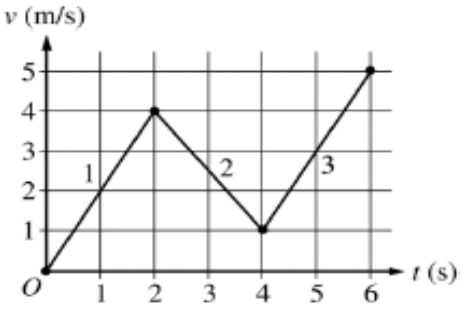
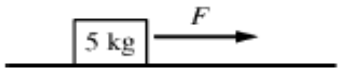


5.3

1 The graph above shows velocity v as a function of time t for a 0.50 kg object traveling along a straight line. The graph has three segments labeled 1, 2, and 3. A rope exerts a constant force of magnitude F_T on the object along its direction of motion the whole time. During segment 2 only, a frictional force of magnitude F_f is also exerted on the object.

For another identical object initially at rest, no frictional force is exerted during segment 2 (between t = 2 sec and t = 4 sec). A rope exerts the same constant force of magnitude F_T as in the description above. What is the change in the object's kinetic energy during segment 2?

a 3.75 J
b 4.00 J
c 12.0 J
d 16.0 J



5.3

1 A force F is exerted on a 5 kg block to move it along a rough surface, as shown above. The magnitude of the force is initially 5 N, and the block moves at a constant velocity. While the block is moving, the force is instantaneously increased to 12 N. How much kinetic energy does the block now gain as it moves a distance of 2 m?

a 10 J
b 14 J
c 24 J
d 34 J

3 A certain truck has twice the mass of a car. Both are moving at the same speed. If the kinetic energy of the truck is *K* , what is the kinetic energy of the car?

5.3

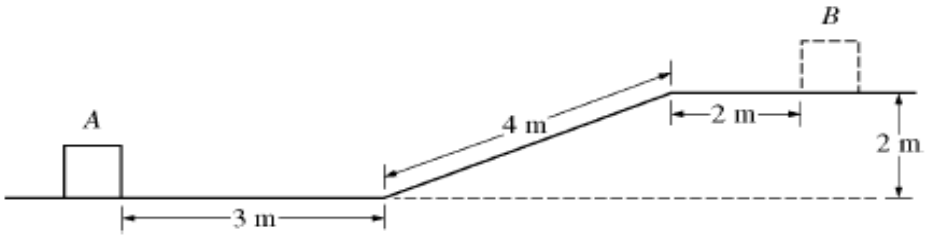
a 2K
b K/4
c 0.71K
d *K/2*

AP Physics 1 Multiple Choice Questions - Chapter 5

1 In which of the following situations is the kinetic energy of the object decreasing?

a A sphere is dropped from a building
b A satellite is moving in a circular orbit around Earth
c A baseball is heading upward after being thrown at an angle
d An elevator is moving upward at a constant velocity

5.4



5.4

2 A block of mass 10 kg moves from position A to position B shown in the figure above. The speed of the block is 10 m/s at A and 4.0 m/s at B. The work done by friction on the block as it moves from A to B is most nearly

a -280 J
b -220 J
c -200 J
d 0 J

3 A person holds a book at rest a few feet above a table. The person then lowers the book at a slow constant speed and places it on the table. Which of the following accurately describes the change in the total mechanical energy of the Earth-book system?

5.4

a The total mechanical energy is unchanged, because there is no change in the book's kinetic energy as it is lowered to the table
b The total mechanical energy is unchanged, because no work is done on the Earth-book system while the book is lowered
c The total mechanical energy decreases, because the person does positive work on the book by exerting a force that opposes the gravitational force.
d The total mechanical energy decreases, because the person does negative work on the book by exerting a force on the book in the direction opposite to its displacement.

AP Physics 1 Multiple Choice Questions - Chapter 5

1 A block of mass 15 kg is attached to the end of a light spring, which stretches 20 cm from its equilibrium position. What is the spring constant for the spring?

a 735 N/m
b 7.35 N/m
c 29.4 N/m
d 2940 N/m

5.5

2 To find the spring constant for a spring, a group of students attach a variety of masses and measure the displacement from equilibrium of the spring. They graph the results with the weight of the block attached on the y-axis and the displacement on the x-axis. How can the students find the spring constant for the spring?

a X-intercept of the line of best fit
b Area under the curve
c Slope of the line of best fit
d Y-intercept of the line of best fit

5.5

3 A 5.0 kg mass is attached to the end of a light spring, which stretches 0.35 m from its equilibrium position. What is the spring constant for the spring?

a 85 N/m
b 140 N/m
c 390 N/m
d 250 N/m

5.5

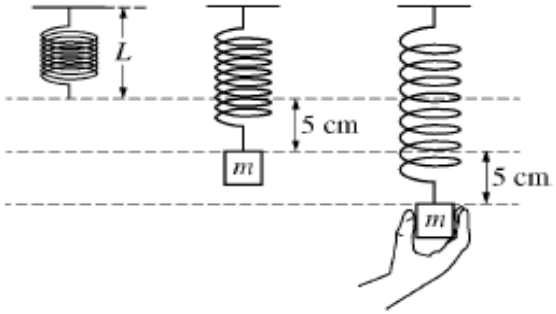
AP Physics 1 Multiple Choice Questions - Chapter 5

1 Two identical blocks are connected to the opposite ends of a compressed spring. The blocks initially slide together on a frictionless surface with velocity v to the right. The spring is then released by remote control. At some later instant, the left block is moving at v / 2 to the left, and the other block is moving to the right. What is the speed of the center of mass of the system at that instant?

5.6

a $5v/2$ **b** $3v/2$

c v **d** $v/2$



2 An object with mass m is suspended at rest from a spring with a spring constant of 200 N/m. The length of the spring is 5.0 cm longer than its unstretched length L, as shown above. A person then exerts a force on the object and stretches the spring an additional 5.0 cm. What is the total energy stores in the spring at the new stretched length?

5.6

a 0.25 J **b** 1.0 J

c 10 J **d** 20 J

3 A block of mass 10.0 kg is attached to a horizontal spring with a spring constant k = 600. N/m. The surface the block rests on is frictionless. If the block is pulled out to x_i = 0.050 m and released, find the speed of the block when x = 0.025 m.

5.6

a 0.24 m/s **b** 0.34 m/s

c 0.48 m/s **d** 0.68 m/s

AP Physics 1 Multiple Choice Questions - Chapter 5

1 A motor exerts a force of 500 N to pull a block 25 m up an inclined plane in 1.5 seconds. What is the power output of the motor?

a 667 W
b 833.3 W
c 6.67 W
d 8333 W

5.7

2 A car accelerates uniformly from rest. When does the car require the greatest power?

a When the car first accelerates from rest
b Just as the car reaches half its maximum speed
c Just before the car reaches its maximum speed
d The question is misleading because the power required is constant
e More information is needed

5.7

3 The electric motor of a model train accelerates the train from rest to 0.620 m/s in 21.0 ms. The total mass of the train is 875 g. Find the average power delivered to the train during its acceleration.

a 2 W
b 8 W
c 4 W
d 16 W

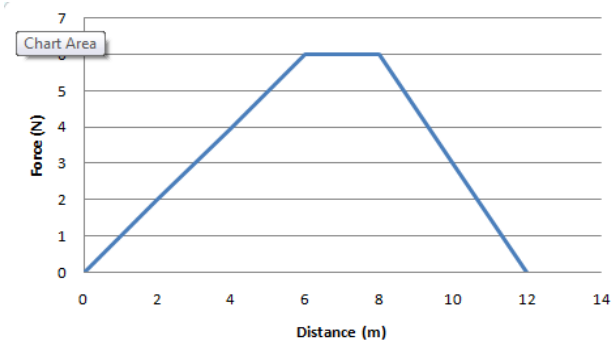
5.7

AP Physics 1 Multiple Choice Questions - Chapter 5

1 A student is asked to determine the work done on a block of wood when the block is pulled horizontally using an attached string. The student is supplied when a spring scale, a stopwatch, and a meterstick. Which of the following graphical analysis techniques will allow the student to determine the work done on the block by the string?

5.8

a Graphing the force as a function of time and calculating the slope
b Graphing the force as a function of time and calculating the area under the curve
c Graphing the force as a function of distance and calculating the slope
d Graphing the force as a function of distance and calculating the area under the curve.

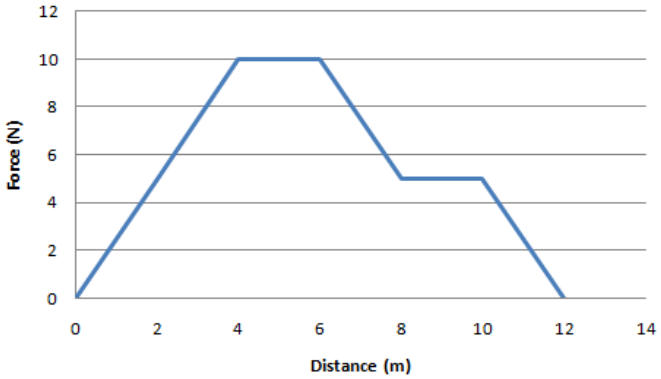


5.8

2 An object of mass 2.00 kg is subject to a force that varies according to the graph above. Find the work done on the object over the distance x = 0 m to x = 12 m.

a 84 J
b 72 J
c 42 J
d 121 J

5.8



3 An object of mass 2.00 kg is subject to a force that varies according to the graph above. Find the work done on the object over the distance x = 0 m to x = 4 m.

a 40 J
b 80 J
c 60 J
d 20 J