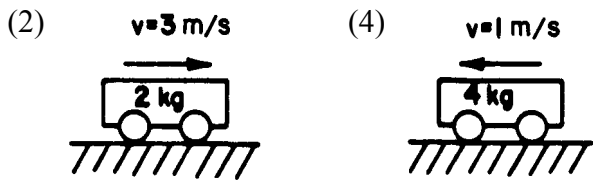
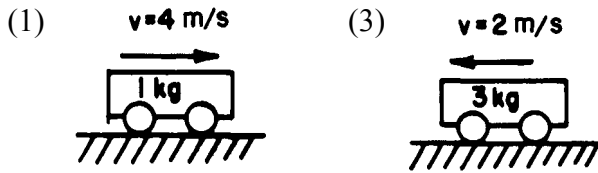


1. If the velocity of a moving object is doubled, the object's kinetic energy is

- (1) unchanged                      (3) doubled  
 (2) halved                          (4) quadrupled

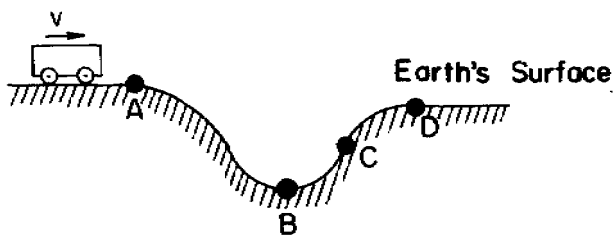
2. Which cart shown below has the greatest kinetic energy?



3. As a block is accelerated from rest along a horizontal surface, its gravitational potential energy

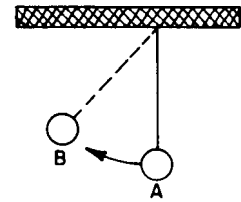
- (1) decreases                      (3) remains the same  
 (2) increases

4. The diagram below represents a cart traveling from left to right along a frictionless surface with an initial speed of  $v$ . At which point is the gravitational potential energy of the cart *least*?



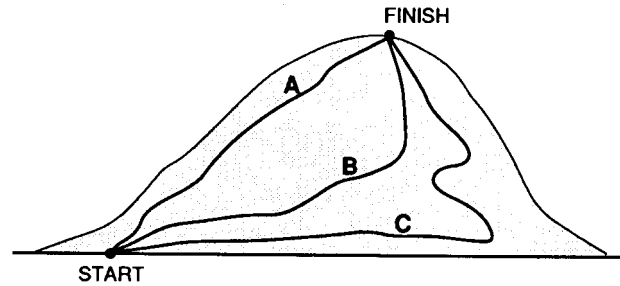
- (1) A                                  (3) C  
 (2) B                                  (4) D

5. As the pendulum swings freely from  $A$  to  $B$  as shown in the diagram to the right, the gravitational potential energy of the ball



- (1) decreases                      (3) remains the same  
 (2) increases

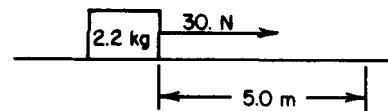
6. Three people of equal mass climb a mountain using paths  $A$ ,  $B$ , and  $C$  shown in the diagram below.



Along which path(s) does a person gain the greatest amount of gravitational potential energy from start to finish?

- (1)  $A$ , only  
 (2)  $B$ , only  
 (3)  $C$ , only  
 (4) The gain is the same along all paths.

7. A 2.2-kilogram mass is pulled by a 30.-newton force through a distance of 5.0 meters as shown in the diagram below. What amount of work is done?



- (1) 11 J                                  (3) 150 J  
 (2) 66 J                                  (4) 330 J

8. Which action would require no work to be done on an object?

- (1) lifting the object from the floor to the ceiling
- (2) pushing the object along a horizontal floor against a frictional force
- (3) decreasing the speed of the object until it comes to rest
- (4) holding the object stationary above the ground

9. A box is dragged up an incline a distance of 8 meters with a force of 50 Newtons. If the increase in potential energy of the box is 300 joules, the work done against friction is

- (1) 100 J
- (2) 200 J
- (3) 300 J
- (4) 400 J

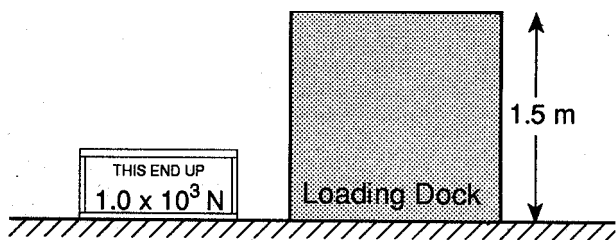
10. An electrical heater raises the temperature of a measured quantity of water. The water absorbs 6,000 joules of energy from the heater in 30.0 seconds. What is the minimum power supplied to the heater?

- (1)  $5.00 \times 10^2$  W
- (2)  $2.00 \times 10^2$  W
- (3)  $1.80 \times 10^5$  W
- (4)  $2.00 \times 10^3$  W

11. How long would it take a machine to do 5,000 joules of work if the power rating of the machine is 100 watts?

- (1) 5,000 sec
- (2) 50 sec
- (3) 10 sec
- (4) 0.2 sec

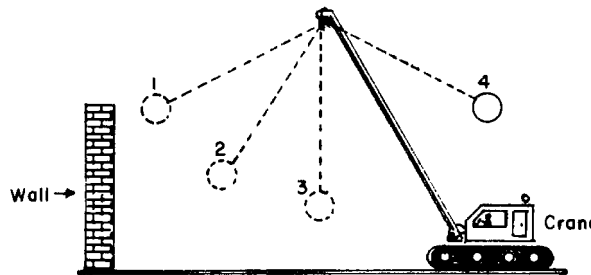
12. The diagram below shows a  $1.0 \times 10^3$ -Newton crate to be lifted at constant speed from the ground to a loading dock 1.5 meters high in 5.0 seconds.



What power is required to lift the crate?

- (1)  $1.5 \times 10^3$  W
- (2)  $2.0 \times 10^2$  W
- (3)  $3.0 \times 10^2$  W
- (4)  $7.5 \times 10^3$  W

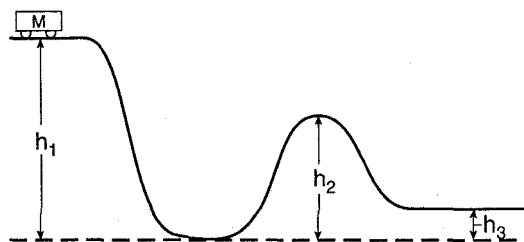
13. The wrecking crane shown below is moving toward a brick wall which is to be torn down.



At what point in the swing of the wrecking ball should the ball make contact with the wall to make a collision with the greatest kinetic energy?

- (1) 1
- (2) 2
- (3) 3
- (4) 4

14. 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  $h_2$ ?

- (1)  $mgh_1$
- (2)  $Mg(h_1 - h_2)$
- (3)  $Mg(h_2 - h_3)$
- (4) 0

15. The work done in accelerating an object along a frictionless horizontal surface is equal to the object's change in

- (1) momentum
- (2) velocity
- (3) potential energy
- (4) kinetic energy

**Answer Key**

1. 4

2. 2

3. 3

4. 2

5. 2

6. 4

7. 3

8. 4

9. 1

10. 2

11. 2

12. 3

13. 3

14. 2

15. 4

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