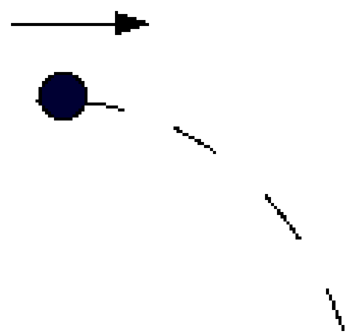
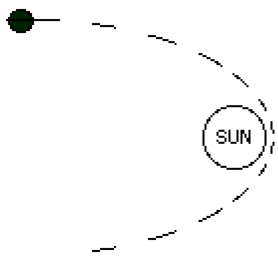
1. A ball is given an initial horizontal velocity and allowed to fall under the influence of gravity, as shown below.



The work done by the force of gravity on the ball is:

1. positive
2. zero
3. negative

2. A comet is speeding along a hyperbolic orbit toward the Sun.



While the comet is moving away from the Sun, the work done by the Sun on the comet is:

1. positive
2. zero
3. negative

3. Consider two carts, of masses *m* and 2*m*, at rest on an air track. If you push first one cart for 3 s and then the other for the same length of time, exerting equal force on each, the kinetic energy of the light cart is

1. larger than
2. equal to
3. smaller than

the kinetic energy of the heavy car.

4. Suppose a ping-pong ball and a bowling ball are rolling toward you. Both have the same momentum, and you exert the same force to stop each. How do the distances needed to stop them compare?

1. It takes a shorter distance to stop the ping-pong ball.
2. Both take the same distance.
3. It takes a longer distance to stop the ping-pong ball.

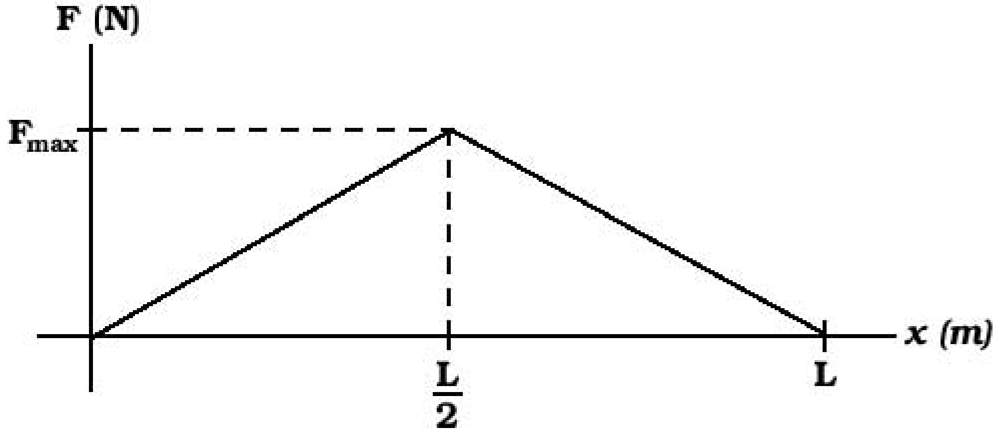
5. A puck moving across a horizontal surface experiences constant negative acceleration due to friction, and comes to rest after 12 seconds. How does the change in energy in the first 6 seconds compare to the change in energy in the last 6 seconds?

1. first half > second half
2. first half = second half
3. first half < second half
4. too little information

6. Compared to the amount of energy required to accelerate a car from rest to 10 miles per hour, the amount of energy required to accelerate the same car from 10 mph to 20 mph is

1. the same
2. twice as much
3. three times as much
4. four times as much

7. A particle starts from rest at x = 0 and moves to x = L under the action of a variable force F(x), which is shown in the figure. What is the particle's kinetic energy at x=L/2 and at x=L?



1.F_{max} L/2, F_{max}L
2.F_{max} L/4, 0
3.F_{max} L, 0
4.F_{max} L/4, F_{max} L/2
5.F_{max} L/2, F_{max} L/4

8. Consider two blocks stacked on a table. Someone pulls the bottom block to the right with a rope in such a way that both bocks accelerate to the right but no slipping occurs at the interface between the top and bottom blocks. Friction at the interface between the two blocks does

1. Positive work on the top block.
2. No work on the top block.
3. Negative work on the top block.

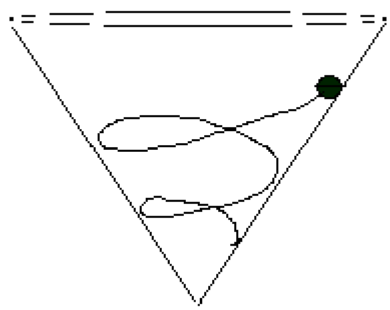
9. Consider a weightlifter holding a 500 pound-barbell above his head. The weightlifter does

1. Positive work on the barbell.
2. Negative work on the barbell.
3. No work on the barbell.

10. When a person walks, the force of friction between the floor and the person's feet accelerates the person forward. The floor does

1. Positive work on the person.
2. Negative work on the person.
3. No work on the person.

11. A ball is rolling in a spiral path down the inside of a hollow cone.



The work done by the inner surface of the cone on the ball is

1. positive
2. zero
3. negative

12. A streetcar is freely coasting (no friction) around a large circular track. It is then switched to a small circular track. When coasting on the smaller circle its linear speed is

1. greater
2. less.
3. unchanged.