Albert Einstein lowers a book of mass m downward  a distance h at constant speed v. The work done on the book by

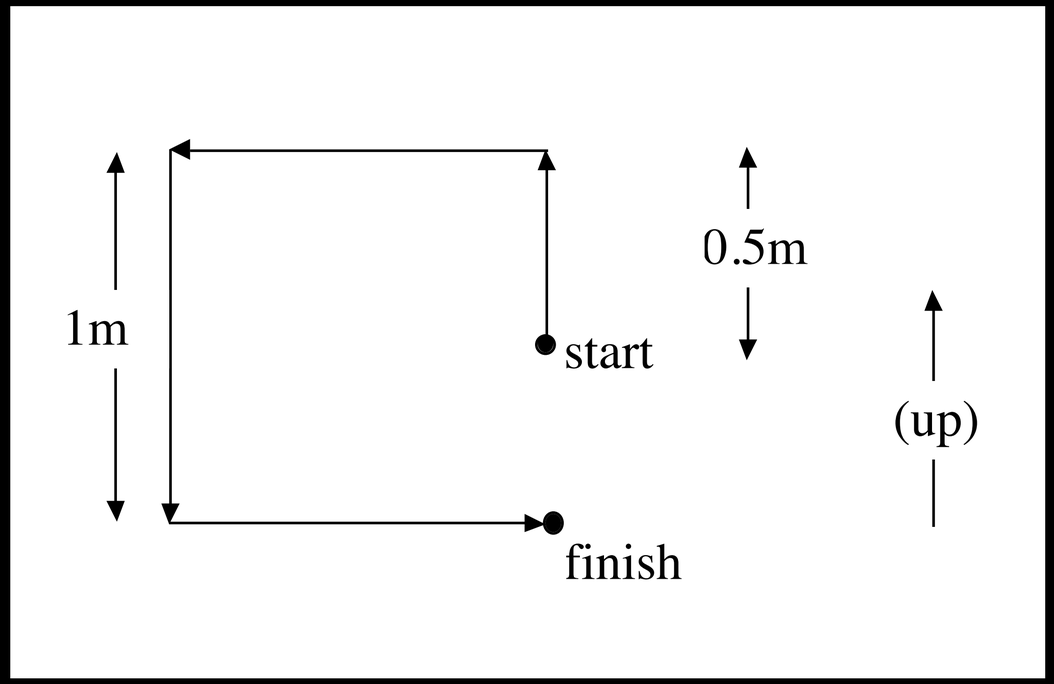
the force of gravity is...
the force of Albert's hand is...

The net work done on the book is...

A: +  B: -  C: 0

A 1 kg object is moved part way around a square loop as shown. The square is 1m on a side. The final position is 0.5 m lower than where it started.
How much work has *gravity* done on the object during its journey? (Use g=10 m/s$^2$)

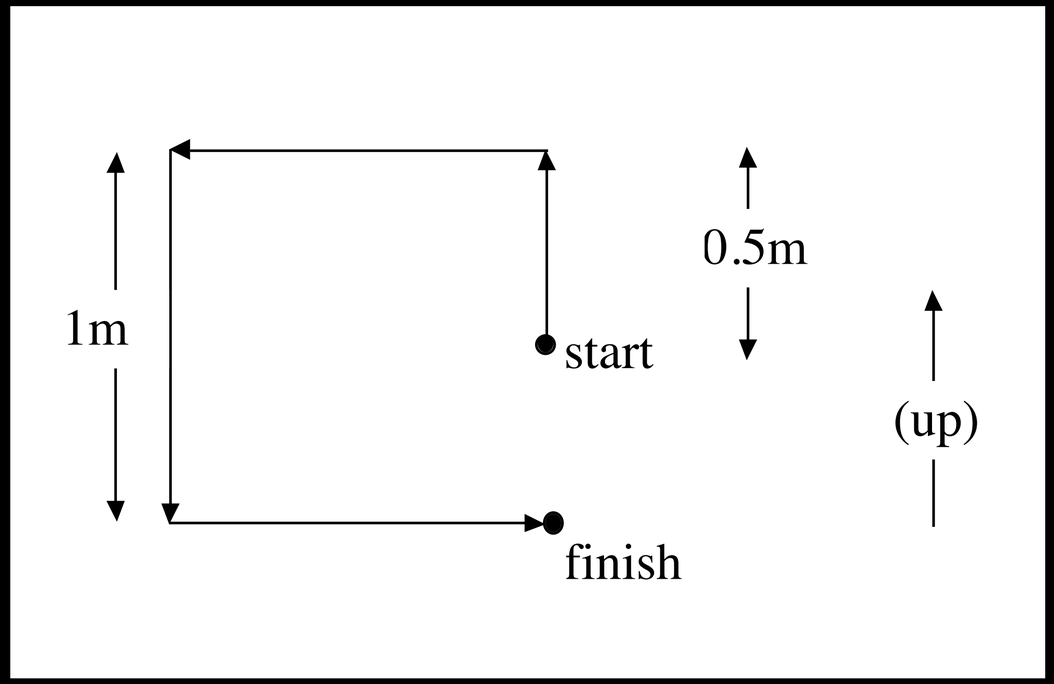
A) +5 J
B) -5 J
C) +10 J
D) -10 J
E) 0 J



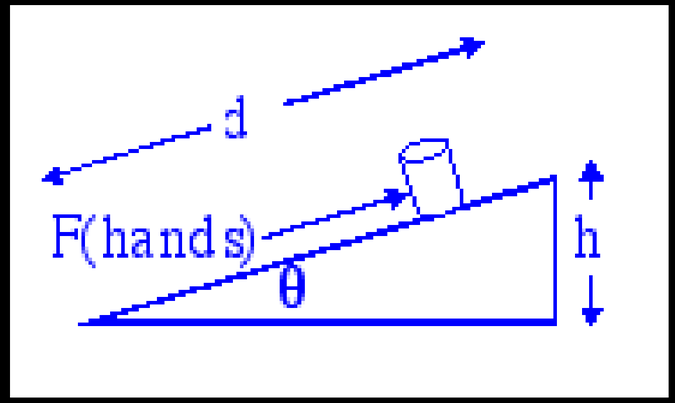
A 1 kg object is moved part way around a square loop as shown. The square is 1m on a side. The final position is 0.5 m lower than where it started.

How much work have YOU done on the object during its journey? (Use g=10 m/s$^2$)

A) +5 J
B) -5 J
C) +10 J
D) -10 J
E) 0 J



You push a beer keg up a ramp with *constant* speed. Suppose you push parallel to the ramp, with force "F". The keg travels a distance d along the ramp, ending at height h as shown.




How much work did YOU do on the keg?

A) F d  B) F d cos θ  C) zero
D) F h (which is equal to F d sin θ)  E) None of these

How much work did GRAVITY do on the keg?

A) mg d  B) mg d cos θ  C) zero
D) mg h (which is equal to mg d sin θ)  E) None of these - it's -mgh

Suppose you want to ride your mountain bike up a steep hill. Two paths lead from the base to the top, one twice as long as the other. (Neglect friction i.e. consider only your "fight against gravity")

Compared to the average **force** you would exert if you took the short path, the average **force** you exert along the longer path is

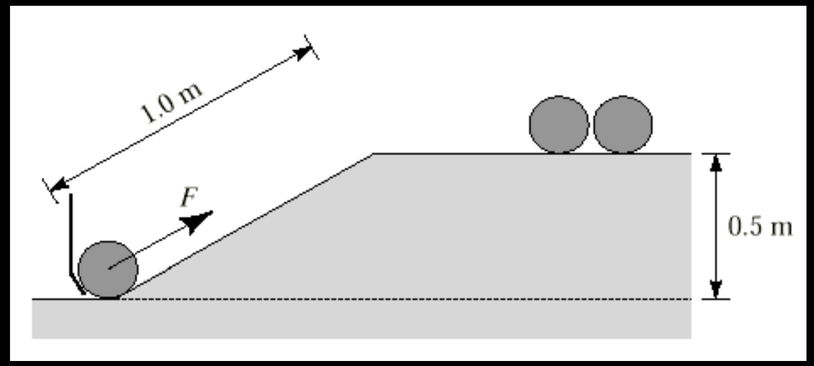
A: four times smaller.
B: half as big.
C: twice as big.
D: the same.
E: undetermined—depends on time taken.

Two marbles, one twice as heavy as the other, are dropped to the ground from the roof of a building.  (Assume no air resistance.) Just before hitting the ground, the heavier marble has..

A: as much kinetic energy as the lighter one.
B: twice as much kinetic energy as the lighter one.
C: half as much kinetic energy as the lighter one.
D: four times as much kinetic energy as the lighter one.
E: impossible to determine.

At the bowling alley, the ball-feeder mechanism must exert a force to push the bowling balls up a 1.0-m long ramp.

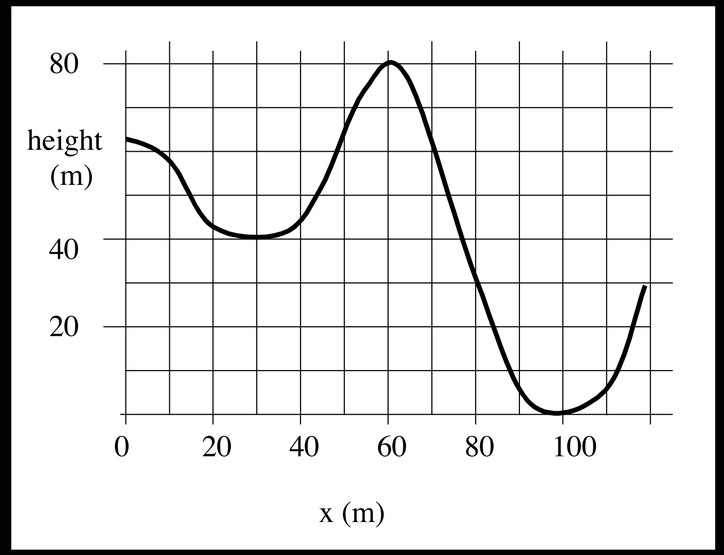
The ramp leads the balls to a chute 0.5 m above the base of the ramp.




Approximately how much force must be exerted on a 5.0-kg bowling ball?

A) 200 N  B) 50 N  C) 25 N  D) 5.0 N
E) impossible to determine

A roller coaster rolls without friction along a track shown below. Its initial speed at the beginning of the track (which is somewhere off to the left, not shown) is great enough to allow it coast along the whole track. Neglect friction.



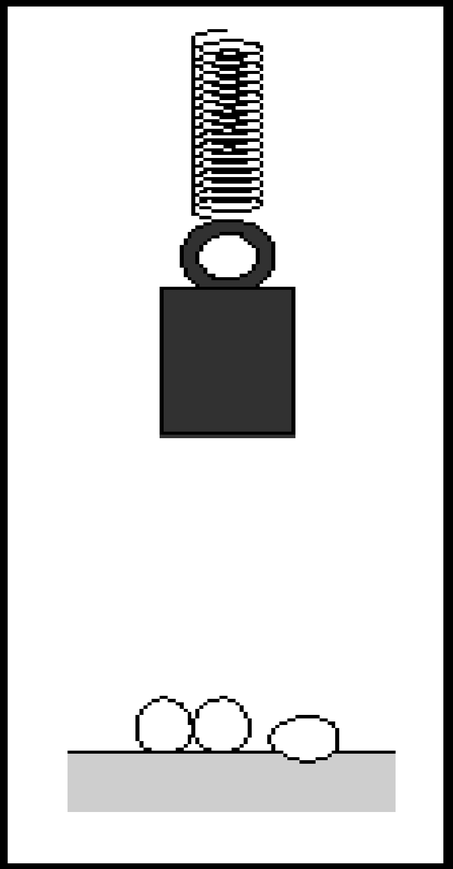

At what position, x, is the kinetic energy a *maximum*, and at what position, x, is the potential energy *minimum*.

A) KE Max at 100; PE Min at 100
B) KE Max at 60; PE Min at 60
C) KE Max at 100; PE Min at 60
D) KE Max at 60; PE Min at 100
E) KE Max at 30; PE Min at 30

A 10-kg weight is suspended from the ceiling by a spring. The weight-spring system is at equilibrium with the bottom of the weight about 1 m above the floor.

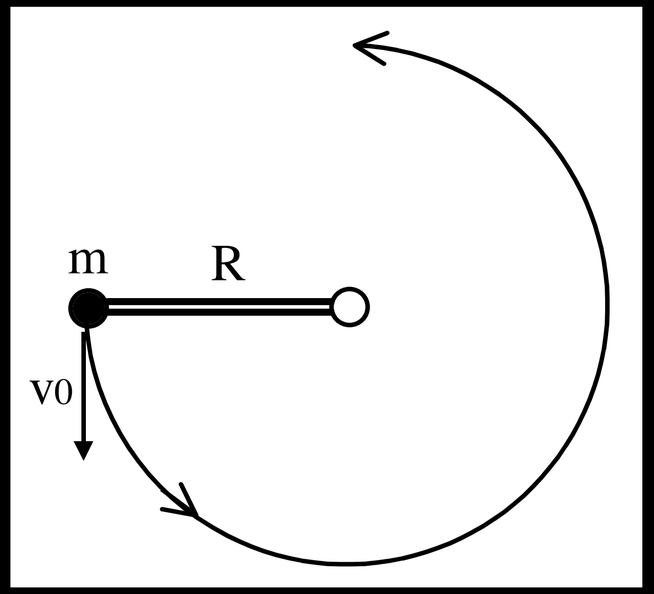
The spring is then stretched until the weight is just above the eggs. When the spring is released, the weight is pulled up by the contracting spring and then falls back down under the influence of gravity.

On the way down, it



A) reverses its direction of travel well above the eggs.
B) reverses its direction of travel precisely as it reaches the eggs.
C) makes a mess as it crashes into the eggs.

A mass m is at the end of a light (massless) rod of length R, the other end of which has a frictionless pivot.
The rod is initially horizontal and the mass is pushed down with an initial speed $v_o$.



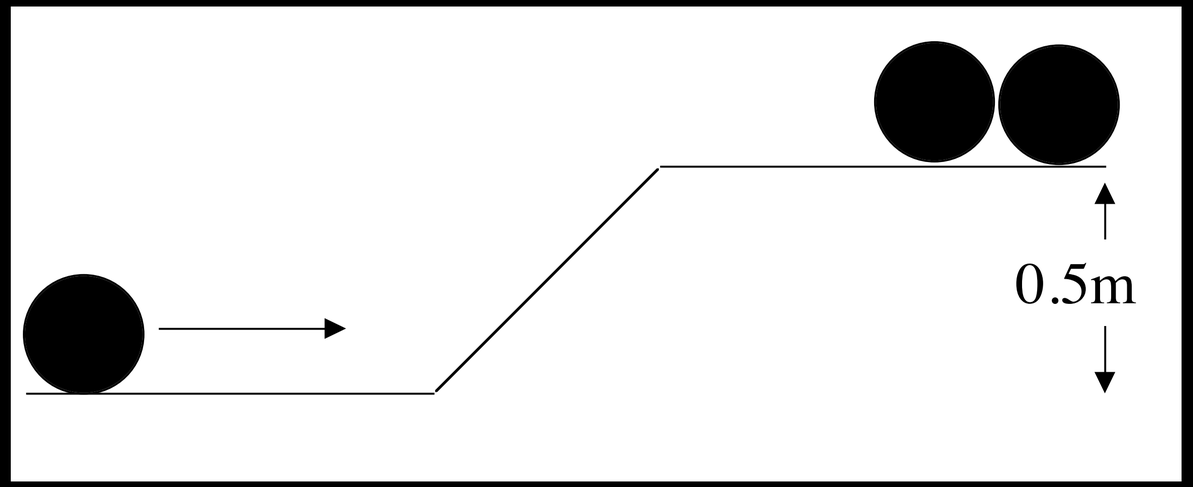

What is the change in potential energy of the mass, when it goes from this starting position to the top of the circle ("12 oclock")

A) mgR
B) 2 mgR
C) 3 mgR
D) -mgR
E) none of the above / not enough info

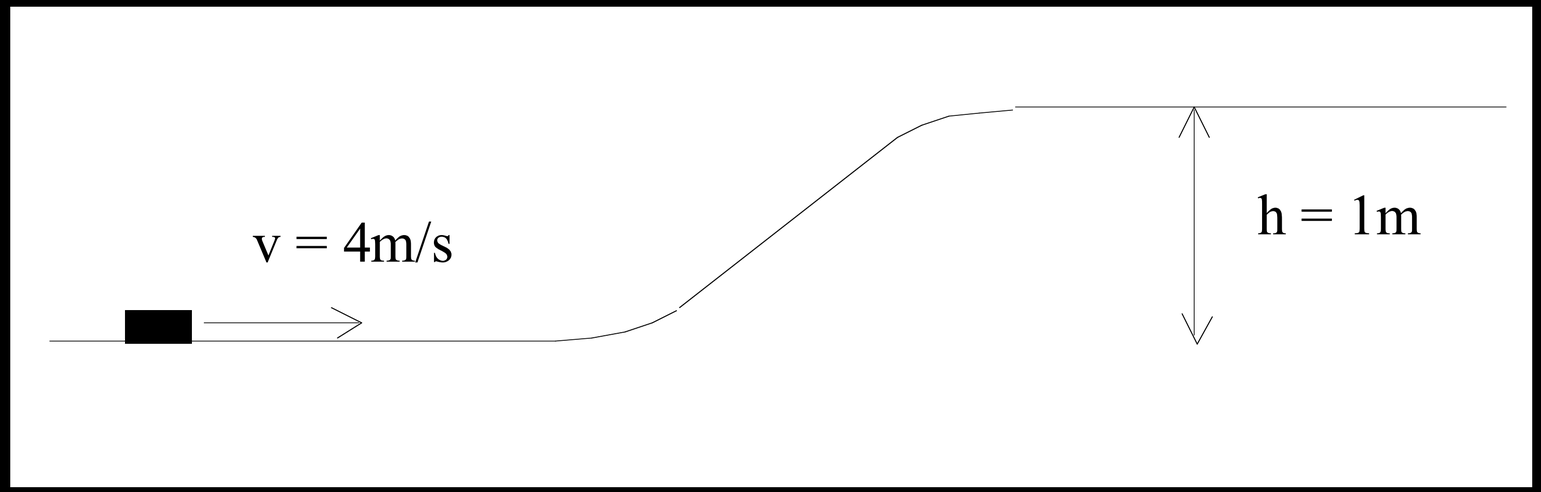
At the bowling alley, a 4 kg ball is rolling back towards the ramp at a speed of 2 m/s. The ramp leads the balls to a chute 0.5 m above the base of the ramp.

Will the ball make it up the ramp?

A) Yes
B) No
C) not enough information



A hockey puck slides without friction along a frozen lake toward an ice ramp and plateau as shown. The speed of the puck is 4m/s and the height of the plateau is 1m. Will the puck make it all the way up the ramp?




A) Yes
B) No
C) not enough information