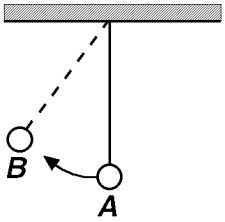
1) As an object falls freely near the Earth's surface, the loss in gravitational potential energy of the object is equal to its

A) loss of mass B) loss of height C) gain in kinetic energy D) gain in velocity

2) At what point in its fall does the kinetic energy of a freely falling object equal its potential energy?

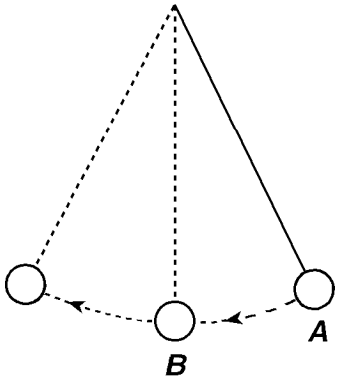
A) at the end of the fall
B) at all points during the fall
C) halfway between the start and the end
D) at the start of the fall

3) As the pendulum swings freely from *A* to *B* as shown in the diagram below, the gravitational potential energy of the pendulum



A) remains the same
B) decreases
C) increases

4) In the diagram below, an ideal pendulum released from point *A* swings freely through point *B*.



Compared to the pendulum's kinetic energy at *A*, its potential energy at *B* is

A) four times as great B) the same C) half as great D) twice as great

5) An object 10 meters above the ground has *Z* joules of potential energy. If the object falls freely, how many joules of kinetic energy will it have gained when it is 5 meters above the ground?

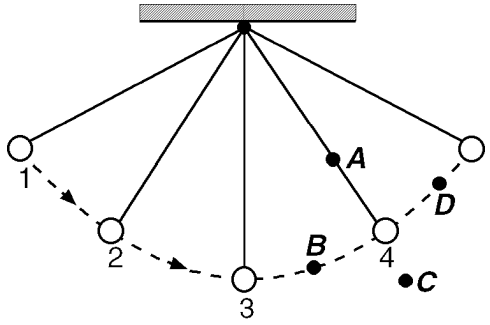
A) 0 B) 2*Z* C) *Z* D) *Z*

6) A basketball player who weighs 600 newtons jumps 0.5 meter vertically off the floor. What is her kinetic energy just before hitting the floor?

A) 60 J B) 300 J C) 30 J D) 600 J

Questions 7 through 9 refer to the following:

The diagram below 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.



7) 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

A) the same
B) less
C) greater

8) What is the potential energy of the bob at position 1 in relation to position 3?

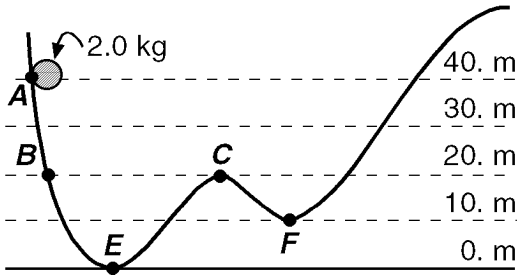
A) 36 joules
B) 18 joules
C) 180 joules
D) 72 joules

9) At which position does the bob have its maximum kinetic energy?

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

Questions 10 and 11 refer to the following:

The diagram below 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*.



10) As the mass travels along the track, the maximum height it will reach above point *E* will be *closest* to

A) 30. m
B) 40. m
C) 20. m
D) 10. m

11) Compared to the total mechanical energy of the system at point *A*, the total mechanical energy of the system at point *F* is

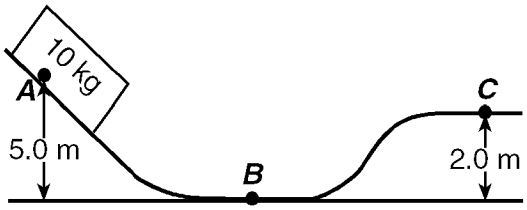
A) more
B) the same
C) less

12) A 2.0-kilogram mass falls freely for 10. meters near the surface of the Earth. The total kinetic energy gained by the object during its free fall is approximately

A) 200 joules B) 400 joules C) 100 joules D) 50 joules

Questions 13 and 14 refer to the following:

The diagram below represents a frictionless track. A 10-kilogram block starts from rest at point *A* and slides along the track.



13) What is the approximate speed of the block at point *B*?

A) 10 m/s B) 50 m/s C) 100 m/s D) 1 m/s

14) What is the approximate potential energy of the block at point *C*?

A) 300 J B) 20 J C) 500 J D) 200 J