Work done

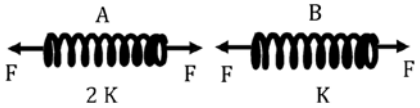
Q.1 Which of the following statements regarding conservation force is NOT correct.

(A) Total energy remains constant. **(B)** Work done in round trip is zero.

(C) Work done is dependent on path. **(D)** Work done is completely recoverable.

Spring Energy

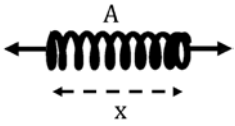
Q.2 If the energy stored in spring 'A' is 20 J, then energy stored in spring 'B' is (under the same stretching force.)



(A) 10 J **(B)** 25 J **(C)** 40 J **(D)** 35 J

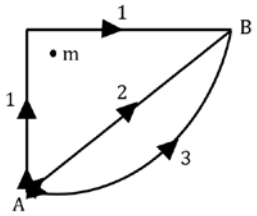
Potential Energy

Q.3 A spring of original length x is s extended to twice its length. If the force constant of the spring is K N/m, its potential energy is.



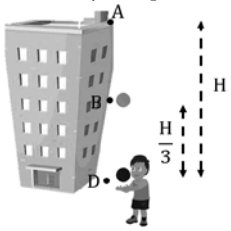
(A) $\frac{kx^2}{2}$ **(B)** $\frac{3kx^2}{2}$ **(C)** $2kx^2$ **(D)** $\frac{5kx^2}{2}$

Q.4 If U_1, U_2, U_3 represent the potential energy difference for moving a particle from A to B along three different paths 1,2&3 (as shown in the figure) in the gravitational field of point mass m find the correct relation between U_1, U_2, U_3



(A) $U_1 = U_2 = U_3$ **(B)** $U_1 > U_2 > U_3$ **(C)** $U_1 < U_2 < U_3$ **(D)** $U_1 > U_2 < U_3$

Q.5 A particle of mass 5 kg is projected vertically upward from point D on the ground the ratio of potential energy at point B and at point A is (take point D as reference)

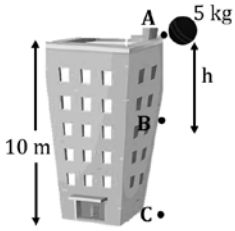


(A) 1:3 **(B)** 3:1 **(C)** 3:2 **(D)** 3:4

Q.6 An F – x graph is shown on below find the difference in initial and final potential energies x = 0 m to x = 3 m.

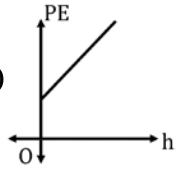
(A) 5 J **(B)** 10 J **(C)** 15 J **(D)** 20 J

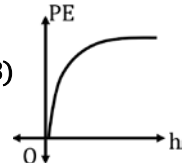
Q.7 A particle of mass 5 kg is drooped from a tower of height 10 m. find the difference of work done by gravity from point A to B (W_{AB}) and change in potential energy from A to B (U_{AB}).

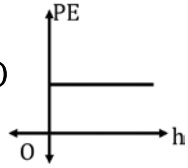


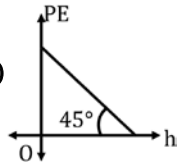
(A) 10 gh **(B)** 5 gh **(C)** – 10 gh **(D)** – gh

Q.8 When a body is through vertically upwards from bottom of the building, its potential energy changes with height as (take the bottom of the building as reference point.

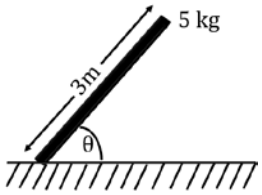
(A) 

(B) 

(C) 

(D) 

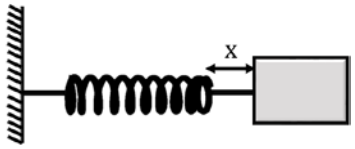
Q.9 A uniform rod of mas 5 kg and length 3 m is held at an angle $\theta = 37°$ with the horizontal as shown in the figure. The potential energy of the rod is (in J)



(A) $\frac{21g}{2}$ **(B)** $\frac{9g}{2}$ **(C)** 12 g **(D)** 6 g

Work Done

Q.10 A spring block system is compressed xm from the mean position and released find out the total work done by the spring force when it reaches the other extreme point (fully stretched) neglect friction.

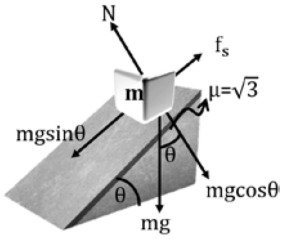


(A) $\frac{1}{2}kx^2$ **(B)** kx^2 **(C)** $\frac{1}{2}k(2x)^2$ **(D)** 0

WORK SHEET

Friction

Q.11 A cubical block rest on a plane of $\mu = \sqrt{3}$.the angle through which the plane be inclined to the horizontal so that the block just slides down will be.



(A)30° **(B)**45° **(C)**60° **(D)**75°

Vector

Q.12 The resultant of two forces 3P and 2Pis R. If the first force is doubled then the resultant is also doubled. Find the angle between the two forces.

(A)60° **(B)**120° **(C)**70° **(D)**180°

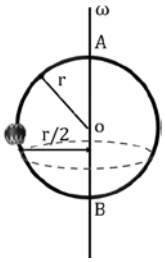
Angular Speed

Q.13 A ball of mass m = 0.5 kg is attached to the end of a string having length l = 0.5 m. The ball is rotated on a horizontal circular path about the vertical axis, as shown in figure. The maximum tension that the string can bear is 324 N. Then, maximum possible value of angular speed of ball (in rad/s) will be.

(A)9 rad/s **(B)**18 rad/s **(C)**27 rad/s **(D)**36 rad/s

Rotation

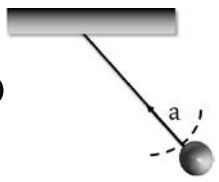
Q.14 A smooth wire of length 2πr is bent t into a circle and kept in a vertical plane. A bead can slide smoothly on the wire. When the circular frame is rotating with angular speed ωabout the vertical diameter AB, the bead is at rest with respect to the circular frame at the position shown in the figure. Then, the value of ω^2 is equal to.

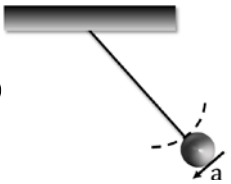


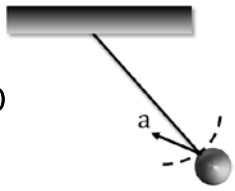
(A) $\frac{\sqrt{3}g}{2r}$ **(B)** $\frac{2g}{\sqrt{3}r}$ **(C)** $\frac{g\sqrt{3}}{r}$ **(D)** $\frac{2g}{r}$

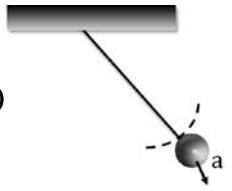
Acceleration

Q.15 A simple pendulum is oscillating without damping. When the displacement of the bob is less than maximum, its acceleration vector $\vec{a}$ is correctly shown in which of the following options?

(A) 

(B) 

(C) 

(D) 

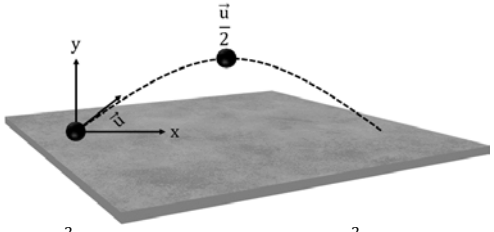
Motion Under gravity

Q.16 A balloon is moving vertically upward with a velocity of 5 m/s when it is at a height of h, a body is gently released from it. If it reaches the ground in 3s, the height of the balloon when the body is released is (Take g = 10m/s^2)

(A)45 m **(B)**60 m **(C)**30 m **(D)**15 m

Projectile

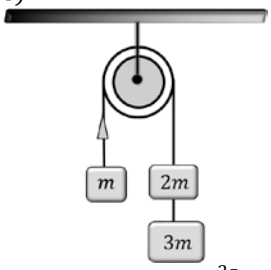
Q.17 The velocity at the maximum height of a projectile is $\frac{1}{2}$times its initial velocity of projection (u) its range on the horizontal plane is.



(A)$\frac{\sqrt{3}u^2}{2g}$ **(B)**$\frac{3u^2}{2g}$ **(C)**$\frac{3u^2}{g}$ **(D)**$\frac{u^2}{2g}$

Pulley Mass system

Q.18 In the figure given below, with what acceleration does the block of mass 2 m moves? (Pulley and strings are massless and frictionless)



(A)$\frac{g}{3}$ **(B)**$\frac{2g}{5}$ **(C)**$\frac{2g}{3}$ **(D)**$\frac{7g}{3}$

Friction

Q.19 A block is shot with an initial velocity of 5 m/s on a rough horizontal plane. Find the distance covered by the block till it comes to rest. Given the coefficient of friction between the surfaces of contact is 0.2 and $g = 10\ m/s^2$.

(A)12 m **(B)**25 m **(C)**6.25 m **(D)**20 m

Pulley Mass system

Q.20 A pulley mass 50 kg stands on a frame of mass 30 kg He pulls on a light rope which passes over a pulley. The other end of the rope is attached to the frame. For the system to be in equilibrium, what force must the man exert on the rope? (Take $g = 10\ m/s^2$)

(A)400 N **(B)**374 N **(C)**418 N **(D)**448 N

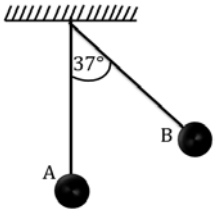
Ration of energy

Q.21 A ball of mass 5 kg is dropped from a cliff of height 75 m. What is the ratio of the kinetic energy to the potential energy of the ball when it reaches the halfway point of the fall?

(A)2 **(B)**1 **(C)**$\frac{1}{2}$ **(D)**$\frac{3}{4}$

Potential Energy

Q.22 A pendulum of mass m kg having velocity v at point A. what is the change in potential energy when the pendulum reaches point B as show in the figure.



(A)$\frac{mgl}{2}$ **(B)**$\frac{2mgl}{5}$ **(C)**$\frac{mgl}{5}$ **(D)**$\frac{4mgl}{5}$

Work Done

Q.23 Work done by a conservative force on a system is equal to

(A) The change in kinetic energy of the system

(B) The negative of the change in potential energy of the system

(C) The change in total mechanical energy of the system

(D) None of the above

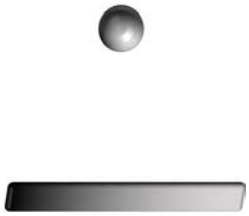
Compression

Q.24 A block of mass 5 kg is drooped on a vertical spring of spring constant 1200 N/m from a height of 10 m assuming that all the energy of the block is absorbed by the spring what is the compression produced in the spring? (Take g = 10 m/s^2)

(A)9.12 m **(B)**912 mm **(C)**9.12 mm **(D)**11.2 cm

Work Done

Q.25 A ball of mass 400 g is dropped to the ground from a height of 30 m the ball bounces back multiple times before coming to rest. Which of the following statements is correct?



(A) The potential energy of the ball increases as the ball bounces.

(B) The work done by gravity increases if the ball bounces more number of times.

(C) The work done by air resistance increases if the ball bounces more number of times

(D) The kinetic energy of the ball increases if the ball bounces more number of times

Potential Energy

Q.26 A ball of mass 600g is dropped to the ground from a height of 25 m. if the energy of the ball reduces by 35 % after striking the ground, what is the height to which it rebounds?

(A)20 m **(B)**16.25 m **(C)**17.16 m **(D)**18.02 m

Potential Energy

Q.27 A block is attached to a spring having equilibrium position at x = 0 the block oscillates between x = – 4 m and x = 4 m. Find the change in potential energy stored in the spring when the block moves from x = 2 to x = – 3 given the spring constant is 5N/m.

(A)12.5 J **(B)**32.5 J **(C)**37.5 J **(D)**10 J

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(C)	(C)	(C)	(A)	(A)	(C)	(A)	(A)	(B)	(D)
WORK SHEET										
Q.	11	12	13	14	15	16	17	18	19	20
Sol.	(C)	(B)	(D)	(B)	(C)	(C)	(A)	(C)	(C)	(A)
Q.	21	22	23	24	25	26	27			
Sol.	(B)	(C)	(B)	(B)	(C)	(B)	(A)			