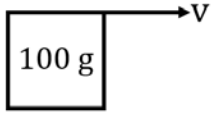
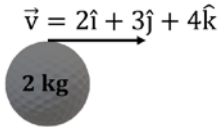
Kinetic Energy

Q.1 What is the speed of mass 100 g having kinetic energy of 20 J?



(A) 10 m/s **(B)**15 m/s **(C)**20 m/s **(D)**25 m/s

Q.2 A body of mass 2 Kg is moving uniformly with the velocity of $2\hat{\imath} + 3\hat{\jmath} + 4\hat{k}$. Finds its kinetic energy

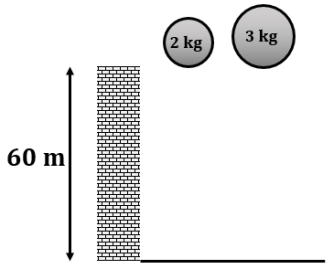


(A)21 J **(B)**25 J **(C)**37 J **(D)**29 J

Q.3 Two bodies of mass 3 kg and 6 kg possess kinetic energies of 6 J and 10 J respectively. What is the ration of their linear momentum?

(A) $\sqrt{\frac{3}{10}}$ **(B)** $\sqrt{\frac{3}{5}}$ **(C)** $\sqrt{\frac{10}{3}}$ **(D)** $\sqrt{\frac{5}{3}}$

Q.4 Two object of masses 2 kg and 3 kg are drooped from a tower of height of 60 m. the ratio of their kinetic energy when they reach the ground is.



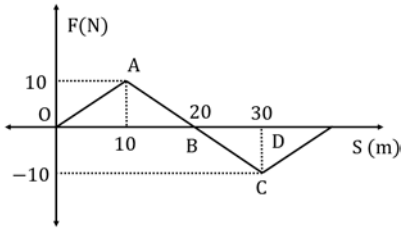
(A) 1:2 **(B)**2:3 **(C)**2:1 **(D)**1:1

Work Energy Theorem

Q.5 A man applied a constant force of 5 N on an object of mass 2 kg and displaces it by 5 m the object was initially at rest. The final velocity of object is.

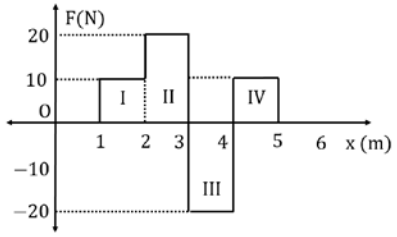
(A)10 m/s **(B)**5 m/s **(C)**20 m/s **(D)**15 m/s

Q.6 Force versus displacement curve is shown in the diagram. Find the change in kinetic energy by the force at the end of 30 m.



(A)25 J **(B)**50 J **(C)**75 J **(D)**100 J

Q.7 For the force-displacement graph for a particle is as shown below. If the particle has mass of 2 Kg and has initial velocity of 2m/s calculate final kinetic energy of particle, when it displaces from x = 1 m to x = 5 m.

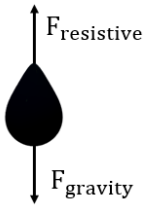


(A) 24 J **(B)**10 J **(C)**30 J **(D)**0 J

Q.8 A bullet of mass 50 g eaves a rifle at an initial velocity of 2000 m/s and strikes the earth at the same level with a velocity of 1000 m/s.The work done in overcoming the resistance of air will be.

(A) 750 J **(B)**7.5×10^3 J **(C)**4500 J **(D)**7.5×10^4 J

Q.9 Consider a rain drop of rain water having mass 1g falling from a height of 2 km.It hits the ground with a speed of 50 m/s the work done by resistive force of air is. ($g = 10$ m/s^2)



(A)–187.5 J **(B)**43.75 J **(C)**–18.75 J **(D)**14.374 J

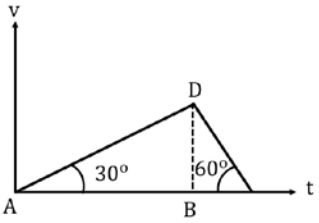
Q.10 A force acts on a 10 g particle in such a way that the position of particle as a function of time is given by $x = 3 + 4t^2$, where x is in m and t is in second the work during first 7 s is.

(A) 156.8 J **(B)**15.68 J **(C)**78.4 J **(D)**7.84 J

WORK SHEET

Net Force

Q.11 For a certain body the velocity – time graph is show in the figure. The ratio of applied force for intervals AB and BC are.



(A) $-\frac{1}{3}$ **(B)** $-\frac{4}{5}$ **(C)** $\frac{3}{5}$ **(D)** $-\frac{2}{3}$

Relative Velocity

Q.12 A ship A sailing due east with a absolute velocity of 10km/h which appears to be sailing due north with a velocity of 5km/h to a person, sitting in a moving ship B.Determine the velocity (absolute) of ship B.

(A) $5\sqrt{5}$ Km/h **(B)** $5\sqrt{6}$ Km/h **(C)** $4\sqrt{5}$ Km/h **(D)** $4\sqrt{6}$ Km/h

2D Motion

Q.13 A bomb is dropped on an enemy post by an aero plane flying horizontally with a velocity of 60 kmh^{-1} and at a height of 490 m.At the time of dropping the bomb, how far the aero plane should be from the enemy post so that the bomb may directly hit the target?

(A) $\frac{400}{3}$ m **(B)** $\frac{500}{3}$ m **(C)** $\frac{1700}{3}$ m **(D)** 498m

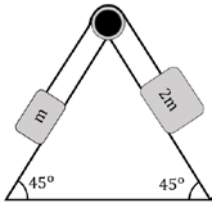
Friction

Q.14 A force of 30 N is sufficient just to pull a block of mass 4 kg horizontally over a flat rough surface. The angle of friction is.

(A) 45° **(B)** 53° **(C)** 37° **(D)** 30°

Tension in a String

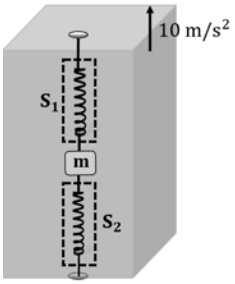
Q.15 Two blocks of masses m and 2 m are placed on triangular wedge by means of a massless inextensible string over a frictionless fixed pulley. Surface of contact between the masses and wedge is frictionless and wedge makes 45° with horizontal on both sides as shown in figure. The tensions in the string (T) is.



(A) $\frac{4mg}{3\sqrt{2}}$ N **(B)** $\frac{2mg}{3\sqrt{2}}$ N **(C)** $\frac{mg}{3\sqrt{2}}$ N **(D)** $\frac{3mg}{\sqrt{2}}$ N

Fnet Force

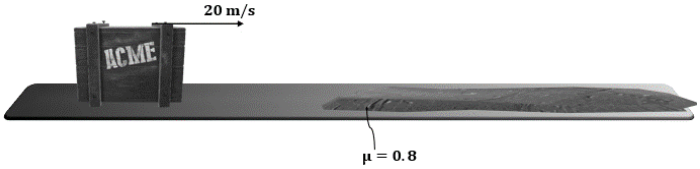
Q.16 Reading shown in two spring balances S_1 and S_2 is 90 kg and 30 kgrespectively and lift is accelerating upwards with acceleration$10\,\frac{m}{s^2}$. If S_1 isElongated and$S_2$is compressed and mass is stationary with respect to lift, then the mass of the block will be.



(A)60 kg **(B)**30 kg **(C)**120 kg **(D)**None of these

Friction

Q.17 A block of mass 10 kg is moving with a uniform sped of 20 m/s enter onto a rough surface of coefficient of friction 0.8, the time taken by the block to come to rest is.



(A) 2.5 s **(B)**5s **(C)**7.5s **(D)**10s

Angular Acceleration

Q.18 A fly wheel of mass 140 kg and radiuses 3 m is rotating 240 rpm. The angular acceleration of flywheel if it comes to rest after 7 rotation is (assume constant angular acceleration)

(A) $\frac{16}{7}\pi\frac{\text{rad}}{\text{s}^2}$ **(B)** $-\frac{16}{7}\pi\frac{\text{rad}}{\text{s}^2}$ **(C)** $\frac{8}{7}\pi\frac{\text{rad}}{\text{s}^2}$ **(D)** $-\frac{8}{7}\pi\frac{\text{rad}}{\text{s}^2}$

Q.19 The kinetic energy K of particle moving along a circle of radius R depends on the distance covered as $K = as^2$, where a is a constant. The force acting on the particle is.

(A) $2a\frac{s^2}{R}$ **(B)** $2a(1+\frac{s^2}{R^2})^{\frac{1}{2}}$ **(C)** 2as **(D)** $2a\frac{R^2}{s}$

Banking angle

Q.20 A circular race track radius 85 m is banked at angle of 37°. If the coefficient of friction between the wheels of a race-car and the road is 0.2, then the maximum possible speed to avoid slipping is $(\tan 37° = \frac{3}{4})$

(A) $\sqrt{950}\frac{\text{m}}{\text{s}}$ **(B)** $\sqrt{550}\frac{\text{m}}{\text{s}}$ **(C)** $\sqrt{1050}\frac{\text{m}}{\text{s}}$ **(D)** $\sqrt{850}\frac{\text{m}}{\text{s}}$

Kinetic Energy

Q.21 Three masses of 3 kg, 4 kg and 5 kg respectively are having same kinetic energy. Which of these masses will move fastest?

(A) 3 kg **(B)**4 kg
(C)5 kg **(D)**All of these masses will have same speed

Q.22 A body of mass 2kg is travelling with uniform velocity from (1, 2, 4) m to (3, 4, 6) m in 4 second the kinetic energy of the body is.

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

Q.23 Two bodies of masses 'm' and '4m' ' are having linear momentum in the ratio of 2:1 respectively. The ratio of their kinetic energy is.

(A)4:1 **(B)**1:4 **(C)**1:8 **(D)**16:1

Q.24 A force is applied of mass 20 kg A force is applied of mass 40 m/s The body attains a velocity of 50 m/s in 2 second. Calculate the work done by the body

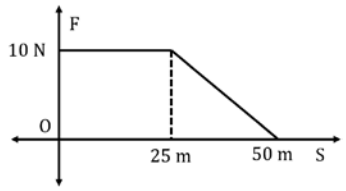
(A) 900 J **(B)**9000 J **(C)**18000 J **(D)**1800 J

Q.25 An object of mass 50 kg is raised to a height of 10 m above the ground. If the object is allowed to fall freely. What is kinetic energy, when it is half way down? ($g = 10\ m/s^2$)

(A)1250 J **(B)**2500 J **(C)**3750 J **(D)**5000 J

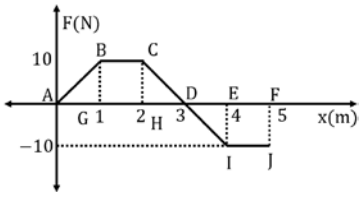
Work Energy Theorem

Q.26 A body of mass 5 kg is acted upon by a variable force which varies with the displacement of the body as shown in the figure. What is the speed of the body when it has covered 25m? (Assume that the body starts from rest.)



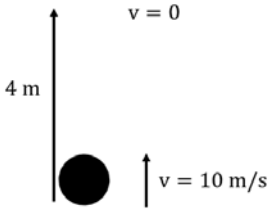
(A)100 m/s **(B)**10 m/s **(C)**25 m/s **(D)**20 m/s

Q.27 A position dependent force F is acting on a particle and its force position curve is shown in the figure. Change in kinetic energy of the particle, when its displacement is from 0 to 5 m is.



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

Q.28 A body of mass 1 kg is thrown upwards with a velocity 10 m/s It momentarily comes to rest after attaining a height of 4m. How much energy is lost due to air friction? ($g = 10 m/s^2$)



(A)40 J **(B)**50 J **(C)**10 J **(D)**100 J

Q.29 A force acts on a 1 kg particle such that position of particle as a function of time is given by $x = 2t^2 - 4$, where ' x ' in m and t is in secondsThe work done during initial 4 s is.

(A)256 J **(B)**54 J **(C)**128 J **(D)**0 J

Q.30 A variable force acts on a 1 kg particle such that acceleration as a function of time is given by $a = 2t$.The particle is starting from rest. Find the work done by the force on particle in first 3 seconds.

(A) 81 J **(B)**40.5 J **(C)**20 J **(D)**10.5 J

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(C)	(D)	(A)	(B)	(B)	(B)	(A)	(D)	(C)	(B)
WORK SHEET										
Q.	11	12	13	14	15	16	17	18	19	20
Sol.	(A)	(A)	(B)	(C)	(A)	(A)	(A)	(B)	(B)	(A)
Q.	21	22	23	24	25	26	27	28	29	30
Sol.	(A)	(B)	(D)	(B)	(B)	(B)	(A)	(C)	(C)	(B)