

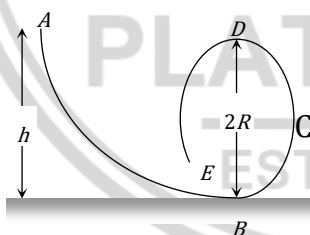
Conservation of Energy and Momentum

31. If a lighter body (mass M_1 and velocity V_1) and a heavier body (mass M_2 and velocity V_2) have the same kinetic energy, then

(a) $M_2 V_2 < M_1 V_1$
 (b) $M_2 V_2 = M_1 V_1$
 (c) $M_2 V_1 = M_1 V_2$
 (d) $M_2 V_2 > M_1 V_1$

32. A frictionless track $ABCDE$ ends in a circular loop of radius R . A body slides down the track from point A which is at a height $h = 5 \text{ cm}$. Maximum value of R for the body to successfully complete the loop is

(a) 5 cm
 (b) $\frac{15}{4} \text{ cm}$
 (c) $\frac{10}{3} \text{ cm}$
 (d) 2 cm



33. The force constant of a weightless spring is 16 N/m . A body of mass 1.0 kg suspended from it is pulled down through 5 cm and then released. The maximum kinetic energy of the system (spring + body) will be

(a) $2 \times 10^{-2} \text{ J}$ (b) $4 \times 10^{-2} \text{ J}$
 (c) $8 \times 10^{-2} \text{ J}$ (d) $16 \times 10^{-2} \text{ J}$

34. Two bodies with kinetic energies in the ratio of $4 : 1$ are moving with equal linear momentum. The ratio of their masses is

(a) $1 : 2$ (b) $1 : 1$
 (c) $4 : 1$ (d) $1 : 4$

35. If the kinetic energy of a body becomes four times of its initial value, then new momentum will

(a) Becomes twice its initial value
 (b) Become three times its initial value
 (c) Become four times its initial value
 (d) Remains constant

36. A bullet is fired from a rifle. If the rifle recoils freely, then the kinetic energy of the rifle is

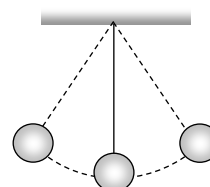
(a) Less than that of the bullet
 (b) More than that of the bullet
 (c) Same as that of the bullet
 (d) Equal or less than that of the bullet



37. If the water falls from a dam into a turbine wheel 19.6 m below, then the velocity of water at the turbine is ($g = 9.8\text{ m/s}^2$)
- (a) 9.8 m/s (b) 19.6 m/s
(c) 39.2 m/s (d) 98.0 m/s
38. Two bodies of masses $2m$ and m have their K.E. in the ratio $8 : 1$, then their ratio of momenta is
- (a) $1 : 1$ (b) $2 : 1$
(c) $4 : 1$ (d) $8 : 1$
39. A bomb of 12 kg divides in two parts whose ratio of masses is $1 : 3$. If kinetic energy of smaller part is 216 J , then momentum of bigger part in kg-m/sec will be
- (a) 36 (b) 72
(c) 108 (d) Data is incomplete
40. A 4 kg mass and a 1 kg mass are moving with equal kinetic energies. The ratio of the magnitudes of their linear momenta is
- (a) $1 : 2$ (b) $1 : 1$
(c) $2 : 1$ (d) $4 : 1$
41. Two identical cylindrical vessels with their bases at same level each contains a liquid of density ρ . The height of the liquid in one vessel is h_1 and that in the other vessel is h_2 . The area of either base is A . The work done by gravity in equalizing the levels when the two vessels are connected, is
- (a) $(h_1 - h_2)g\rho$
(b) $(h_1 - h_2)gA\rho$
(c) $\frac{1}{2}(h_1 - h_2)^2gA\rho$
(d) $\frac{1}{4}(h_1 - h_2)^2gA\rho$
42. If the increase in the kinetic energy of a body is 22% , then the increase in the momentum will be
- (a) 22% (b) 44%
(c) 10% (d) 300%
43. If a body of mass 200 g falls from a height 200 m and its total P.E. is converted into K.E. at the point of contact of the body with earth surface, then what is the decrease in P.E. of the body at the contact ($g = 10\text{ m/s}^2$)



- (a) 200 J (b) 400 J
(c) 600 J (d) 900 J
- 44.** If momentum is increased by 20%, then K.E. increases by
(a) 44% (b) 55%
(c) 66% (d) 77%
- 45.** The kinetic energy of a body of mass 2 kg and momentum of 2 Ns is
(a) 1 J (b) 2 J
(c) 3 J (d) 4 J
- 46.** The decrease in the potential energy of a ball of mass 20 kg which falls from a height of 50 cm is
(a) 968 J
(b) 98 J
(c) 1980 J
(d) None of these
- 47.** An object of 1 kg mass has a momentum of 10 kg m/sec then the kinetic energy of the object will be
(a) 100 J (b) 50 J
(c) 1000 J (d) 200 J
- 48.** A ball is released from certain height. It loses 50% of its kinetic energy on striking the ground. It will attain a height again equal to
(a) One fourth the initial height
(b) Half the initial height
(c) Three fourth initial height
(d) None of these
- 49.** A 0.5 kg ball is thrown up with an initial speed 14 m/s and reaches a maximum height of 8.0m. How much energy is dissipated by air drag acting on the ball during the ascent
(a) 19.6Joule (b) 4.9Joule
(c) 10Joule (d) 9.8Joule
- 50.** An ice cream has a marked value of 700 kcal. How many kilowatt- hour of energy will it deliver to the body as it is digested
(a) 0.81kWh (b) 0.90kWh
(c) 1.11kWh (d) 0.71kWh
- 51.** What is the velocity of the bob of a simple pendulum at its mean position, if it is able to rise to vertical height of 10cm (Take $g = 9.8\text{m/s}^2$)
(a) 0.6 m/s
(b) 1.4 m/s
(c) 1.8 m/s
(d) 2.2 m/s



52. A particle of mass ' m ' and charge ' q ' is accelerated through a potential difference of ' V ' volt. Its energy is
(a) qV (b) mqV
(c) $\left(\frac{q}{m}\right)V$ (d) $\frac{q}{mV}$
53. A running man has half the kinetic energy of that of a boy of half of his mass. The man speeds up by 1 m/s so as to have same $K.E.$ as that of the boy. The original speed of the man will be
(a) $\sqrt{2}\text{ m/s}$
(b) $(\sqrt{2} - 1)\text{ m/s}$
(c) $\frac{1}{(\sqrt{2}-1)}\text{ m/s}$
(d) $\frac{1}{\sqrt{2}}\text{ m/s}$
54. The mass of two substances are 4 gm and 9 gm respectively. If their kinetic energies are same, then the ratio of their momenta will be
(a) $4 : 9$ (b) $9 : 4$
(c) $3 : 2$ (d) $2 : 3$
55. If the momentum of a body is increased by 100% , then the percentage increase in the kinetic energy is
(a) 150% (b) 200%
(c) 225% (d) 300%
56. If a body loses half of its velocity on penetrating 3 cm in a wooden block, then how much will it penetrate more before coming to rest
(a) 1 cm (b) 2 cm
(c) 3 cm (d) 4 cm
57. A bomb of mass 9 kg explodes into 2 pieces of mass 3 kg and 6 kg . The velocity of mass 3 kg is 1.6 m/s , the $K.E.$ of mass 6 kg is
(a) 3.84 J (b) 9.6 J
(c) 1.92 J (d) 2.92 J
58. Two masses of 1 kg and 16 kg are moving with equal $K.E.$ The ratio of magnitude of the linear momentum is
(a) $1 : 2$ (b) $1 : 4$
(c) $1 : \sqrt{2}$ (d) $\sqrt{2} : 1$
59. A machine which is 75% efficient, uses 12 joules of energy in lifting up a 1 kg mass through a certain distance. The mass is then allowed to fall through that distance.





The velocity at the end of its fall is
(in ms^{-1})

- (a) $\sqrt{24}$ (b) $\sqrt{32}$
(c) $\sqrt{18}$ (d) $\sqrt{9}$

60. Two bodies moving towards each other collide and move away in opposite directions. There is some rise in temperature of bodies because a part of the kinetic energy is converted into

- (a) Heat energy
(b) Electrical energy
(c) Nuclear energy
(d) Mechanical energy

