Conservation of Energy and Momentum

1. Two bodies of masses m_1 and m_2 have equal kinetic energies. If p_1 and p_2 are their respective momentum, then ratio $p_1 : p_2$ is equal to

(a) $m_1 : m_2$ (b) $m_2 : m_1$

(c) $\sqrt{m_1} : \sqrt{m_2}$ (d) $m_1^2 : m_2^2$

2. Work done in raising a box depends on

(a) How fast it is raised

(b) The strength of the man

(c) The height by which it is raised

(d) None of the above

3. A light and a heavy body have equal momenta. Which one has greater K.E

(a) The light body

(b) The heavy body

(c) The K.E. are equal

(d) Data is incomplete

4. A body at rest may have

(a) Energy

(b) Momentum

(c) Speed

(d) Velocity

5. The kinetic energy possessed by a body of mass *m* moving with a velocity *v* is equal to $\frac{1}{2}mv^2$, provided

(a) The body moves with velocities comparable to that of light

(b) The body moves with velocities negligible compared to the speed of light

(c) The body moves with velocities greater than that of light

(d) None of the above statement is correct

6. If the momentum of a body is increased *n* times, its kinetic energy increases

(a) *n* times (b) 2*n* times

(c) $\sqrt{n}$times (d) n^2 times

7. When work is done on a body by an external force, its

(a) Only kinetic energy increases

(b) Only potential energy increases

(c) Both kinetic and potential energies may increase

(d) Sum of kinetic and potential energies remains constant

8. The bob of a simple pendulum (mass *m* and length *l*) dropped from a horizontal position strikes a block of the same mass elastically placed on a horizontal frictionless table. The K.E. of the block will be

(a) 2 *mgl* (b) *mgl*/2

(c) *mgl* (d) 0

9. From a stationary tank of mass 125000 *pound* a small shell of mass 25 *pound* is fired with a muzzle velocity of 1000 *ft*/*sec*. The tank recoils with a velocity of

(a) 0.1 *ft*/*sec* (b) 0.2 *ft*/*sec*

(c) 0.4 *ft*/sec (d) 0.8 *ft*/*sec*

10. A bomb of 12 *kg* explodes into two pieces of masses 4 *kg* and 8 *kg*. The velocity of 8*kg* mass is 6 *m*/*sec*. The kinetic energy of the other mass is

(a) 48 *J* (b) 32 *J*

(c) 24 *J* (d) 288 *J*

11. A rifle bullet loses 1/20th of its velocity in passing through a plank. The least number of such planks required just to stop the bullet is

(a) 5 (b) 10

(c) 11 (d) 20

12. A body of mass 2 *kg* is thrown up vertically with K.E. of 490 joules. If the acceleration due to gravity is $9.8 m/s^2$, then the height at which the K.E. of the body becomes half its original value is given by

(a) 50 *m* (b) 12.5 *m*

(c) 25 *m* (d) 10 *m*

13. Two masses of 1 *gm* and 4 *gm* are moving with equal kinetic energies. The ratio of the magnitudes of their linear momenta is

(a) 4 : 1 (b) $\sqrt{2}$: 1

(c) 1 : 2 (d) 1 : 16

14. If the *K.E.* of a body is increased by 300%, its momentum will increase by

(a) 100% (b) 150%

(c) $\sqrt{300}\%$ (d) 175%

15. A light and a heavy body have equal kinetic energy. Which one has a greater momentum?

(a) The light body

(b) The heavy body

(c) Both have equal momentum

(d) It is not possible to say anything without additional information

16. If the linear momentum is increased by 50%, the kinetic energy will increase by

(a) 50% (b) 100%

(c) 125% (d) 25%

17. A free body of mass 8 *kg* is travelling at 2 *meter* per second in a straight line. At a certain instant, the body splits into two equal parts due to internal explosion which releases 16 *joules* of energy. Neither part leaves the original line of motion finally

(a) Both parts continue to move in the same direction as that of the original body

(b) One part comes to rest and the other moves in the same direction as that of the original body

(c) One part comes to rest and the other moves in the direction opposite to that of the original body

(d) One part moves in the same direction and the other in the direction opposite to that of the original body

18. If the K.E. of a particle is doubled, then its momentum will**]**

(a) Remain unchanged

(b) Be doubled

(c) Be quadrupled

(d) Increase $\sqrt{2}$ times

19. If the stone is thrown up vertically and return to ground, its potential energy is maximum

(a) During the upward journey

(b) At the maximum height

(c) During the return journey

(d) At the bottom

20. A body of mass 2 *kg* is projected vertically upwards with a velocity of $2m\,sec^{-1}$. The K.E. of the body just before striking the ground is

(a) 2 *J* (b) 1 *J*

(c) 4 *J* (d) 8 *J*

21. The energy stored in wound watch spring is

(a) K.E.

(b) P.E.

(c) Heat energy

(d) Chemical energy

22. Two bodies of different masses m_1 and m_2 have equal momenta. Their kinetic energies E_1 and E_2 are in the ratio

(a) $\sqrt{m_1}:\sqrt{m_2}$ (b) $m_1:m_2$

(c) $m_2:m_1$ (d) $m_1^2:m_2^2$

23. A car travelling at a speed of 30 *km*/*hour* is brought to a halt in 8 *m* by applying brakes. If the same car is travelling at 60 *km*/*hour*, it can be brought to a halt with the same braking force in

(a) 8 *m* (b) 16 *m*

(c) 24 *m* (d) 32 *m*

24. Tripling the speed of the motor car multiplies the distance needed for stopping it by

(a) 3

(b) 6

(c) 9

(d) Some other number

25. If the kinetic energy of a body increases by 0.1%, the percent increase of its momentum will be

(a) 0.05% (b) 0.1%

(c) 1.0% (d) 10%

26. If velocity of a body is twice of previous velocity, then kinetic energy will become

(a) 2 times (b) $\frac{1}{2}$times

(c) 4 times (d) 1 times

27. Two bodies *A* and *B* having masses in the ratio of 3 : 1 possess the same kinetic energy. The ratio of their linear momenta is then

(a) 3 : 1 (b) 9 : 1

(c) 1 : 1 (d) $\sqrt{3}:1$

28. In which case does the potential energy decrease

(a) On compressing a spring

(b) On stretching a spring

(c) On moving a body against gravitational force

(d) On the rising of an air bubble in water

29. A sphere of mass *m*, moving with velocity *V*, enters a hanging bag of sand and stops. If the mass of the bag is *M* and it is raised by height *h*, then the velocity of the sphere was

(a) $\frac{M+m}{m}\sqrt{2gh}$ (b) $\frac{M}{m}\sqrt{2gh}$

(c) $\frac{m}{M+m}\sqrt{2gh}$ (d) $\frac{m}{M}\sqrt{2gh}$

30. Two bodies of masses *m* and 2*m* have same momentum. Their respective kinetic energies E_1 and E_2 are in the ratio

(a) 1 : 2 (b) 2 : 1

(c) $1:\sqrt{2}$ (d) 1 : 4