

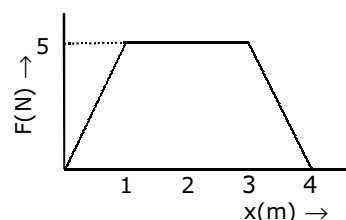
Dear student following is an Easy level [O ● O O O] test paper. Score of 18 Marks in 15 Minutes would be a satisfactory performance. Questions 1-10 (+3, -1). (All Questions have Single Options correct)

- Q.1** The joule is a unit of
 (A) Force (B) power
 (C) impulse (D) energy
- Q.2** What is the work done in lifting a 10 kg load of bricks to the top of a building 20 m high ?
 (A) 98 J (B) 200 J (C) 980 J (D) 1960 J
- Q.3** A force $\vec{F} = (3\hat{i} + 4\hat{j})$ newton acts on a body and displaces it by $\vec{S} = (5\hat{j} + 6\hat{k})$ metre, where \hat{i} , \hat{j} and \hat{k} are unit vectors along x, y and z axes of a rectangular coordinate system. The work done by the force is
 (A) 15 J (B) 18 J (C) 20 J (D) 24 J
- Q.4** The work done in stretching a spring of force constant 20 Nm^{-1} by an amount 30 cm is
 (A) 0.6 J (B) 0.9 J (C) 1.2 J (D) 1.5 J
- Q.5** Two particles of masses m and 4m have linear momenta in the ratio of 2 : 1. What is the ratio of their kinetic energies ?
 (A) $\sqrt{2}$ (B) 2 (C) 4 (D) 16
- Q.6** A man P of mass 80 kg runs up a staircase in 12 seconds. Another man Q of mass 60 kg runs up the same staircase in 11 seconds. What is the ratio of the power developed by P to that by Q ?
 (A) $\frac{4}{3}$ (B) $\frac{12}{11}$ (C) $\frac{49}{33}$ (D) $\frac{11}{9}$
- Q.7** A rocket works on the principle of conservation of
 (A) mass (B) energy
 (C) linear momentum (D) angular momentum

- Q.8** Which one of the following is true in the case of inelastic collisions ?

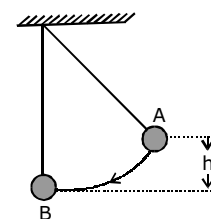
	Total energy	Kinetic energy	Momentum
(A)	conserved	conserved	conserved
(B)	conserved	not conserved	conserved
(C)	conserved	conserved	not conserved
(D)	not conserved	not conserved	conserved

- Q.9** Figure shows the force F acting on a body as a function of x. What is the work done in moving the body from x = 0 to x = 1 m ?



- (A) 2.5 J (B) 5 J (C) 10 J (D) 15 J

- Q.10** The bob A of a pendulum released from a height h hits head-on another bob B of the same mass of an identical pendulum initially at rest. What is the result of this collision ? Assume the collision to be elastic (see Fig).



- (A) Bob A comes to rest at B and bob B moves to the left attaining a maximum height h.
 (B) Bobs A and B both move to the left, each attaining a maximum height h/2.
 (C) Bobs B move to the left and bob A moves to the right, each attaining a maximum height h/2.
 (D) Both bobs come to rest.



PHYSICS IIT JEE (JULY 4th WEEK CLASS TEST 1) (WORK, POWER, ENERGY & COLLISION) ANSWER KEY

Name : Roll No. :

	A	B	C	D		A	B	C	D		A	B	C	D
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	D	D	C	B	D	D	C	B	A	A

SOLUTIONS

Sol.1 (D)

Sol.2 (D)

Force applied $F = mg = 10 \times 9.8 = 98\text{N}$. This force is to be applied vertically upwards in the direction of the displacement $S = 20\text{m}$. Therefore, the work done is
 $W = FS = 98\text{N} \times 20\text{m} = 1960\text{J}$.

Sol.3 (C)

$W = \vec{F} \cdot \vec{S} = (3\hat{i} + 4\hat{j}) \cdot (5\hat{j} + 6\hat{k}) = 20\hat{j} \cdot \hat{j} = 20\text{J}$
 because $\hat{i} \cdot \hat{j} = \hat{i} \cdot \hat{k} = \hat{j} \cdot \hat{k} = 0$, the unit vectors being mutually perpendicular.

Sol.4 (B)

Work done = potential energy
 $= \frac{1}{2} kx^2 = \frac{1}{2} \times 20 \times (0.3)^2 = 0.9\text{J}$.

Sol.5 (D)

Given $p_1 = m_1 v_1 = 2p$ and $p_2 = m_2 v_2 = p$, so that
 $\frac{m_1 v_1}{m_2 v_2} = 2$

The ratio of their kinetic energies is

$$\frac{(KE)_1}{(KE)_2} = \frac{\frac{1}{2} m_1 v_1^2}{\frac{1}{2} m_2 v_2^2} = \frac{m_1^2 v_1^2}{m_2^2 v_2^2} \cdot \frac{m_2}{m_1}$$

But $m_2 = 4m_1$ and $\frac{m_1 v_1}{m_2 v_2} = 2$. Therefore,

$$\frac{(KE)_1}{(KE)_2} = (2)^2 \times 4 = 16$$

Sol.6 (D)

Let h be the vertical height of the staircase. Work done by P is $W_1 = m_1 gh = 80\text{gh}$. Therefore power developed by P is

$$P_1 = \frac{W_1}{t_1} = \frac{80\text{gh}}{12}$$

Similarly, power developed by Q is

$$P_2 = \frac{W_2}{t_2} = \frac{60\text{gh}}{11}$$

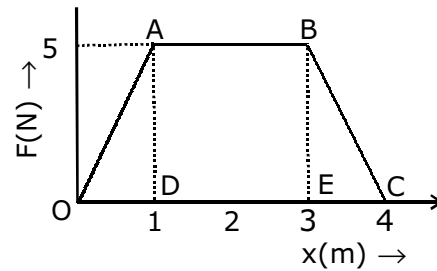
Which give $\frac{P_1}{P_2} = \frac{11}{9}$.

Sol.7 (C)

Sol.8 (B)

Sol.9 (A)

Work done = area under the F - x graph. Work done by the force in moving the body from $x = 0$ to $x = 1\text{m}$ is (see fig.)



$W_1 = \text{area of triangle OAD}$

$$= \frac{1}{2} \times AD \times OD$$

$$= \frac{1}{2} \times 5\text{N} \times 1\text{m}$$

$$= 2.5\text{J}$$

Sol.10 (A)

Suppose the bob A acquires a velocity v on reaching the bob B. In a head-on elastic collision between two bodies of the same mass when one of them is at rest, the velocities are exchanged after the collision. Hence the bob A will come to rest at the lowermost position (occupied by B before collision) and the bob B will move to the left attaining a maximum height h .