

Girls' High School & College, Prayagraj

Worksheet No. -5

Session 2020-2021

Class - IX A B C D E F

Subject- Physics

Chapter- LAWS OF MOTION

Instructions:- Parents are expected to ensure that the student spends two days to read and understand the chapter according to the books and websites referred and thereafter answer the given questions. Student should refer to books of class 6, 7, 8 and also the following books/ websites:

1. Concise Physics, for class- IX, By R. P. Goyal and S. P. Tripathi (Selina Publisher)
2. A New Approach to I.C.S.E. Physics by V. K. Sally and D. Chauhan (Goyal Brothers Prakashan)

Website - <https://youtu.be/ZpQP3ubQKnU>, <https://youtu.be/k8G-z83z6Qk>, http://quiznext.in/study-material/learning_material/ICSE-9-Physics/Laws-of-Motion/gravitation/

Topics :-

1. Newton's Third Law of Motion
2. Gravitation

Questions based on Newton's Third Law of Motion :

(A) Answer the following questions briefly :-

- Q1.** State Newton's third law of motion.
- Q2.** Comment on the statement 'the sum of action and reaction on a body is zero'.
- Q3.** Explain the motion of a rocket with the help of Newton's third law.
- Q4.** When you step ashore from a stationary boat, it tends to leave the shore. Explain.

Q5. When two spring balances joined at their free ends, are pulled apart, both show the same reading. Explain.

Q6. To move a boat ahead in water, the boatman has to push the water backward by his oar. Explain.

Q7. A person pushing a wall hard is liable to fall back. Give reason.

Q8. 'The action and reaction both act simultaneously.' Is this statement true?

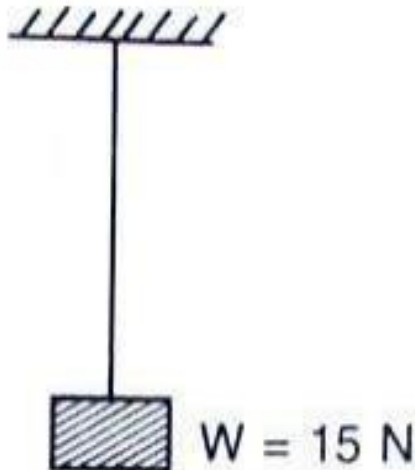
Q9. A light ball falling on ground, after striking the ground rises upwards. Explain the reason.

Q10. Explain the usefulness of Newton's third law of motion.

(B) Numerical problems:

1. A boy pushes a wall with a force of 10 N towards east. What force is exerted by the wall on the boy?

2. A block of weight 15N is hanging from a rigid support by a string. What is force exerted by (a) block on the string, (b) string on the block? Name them and show them in the diagram .



(C) Name and state the action and reaction in the following cases:

1. firing a bullet from a gun,

2. hammering a nail,

3. a book lying on a table,
4. a moving rocket,
5. a person walking on the floor,
6. a moving train colliding with a stationary train.

(2) Questions based on Gravitation :

(A) Answer the following questions briefly:

- Q1.** State Newton's law of gravitation.
- Q2.** What is the importance of the law of gravitation?
- Q3.** Distinguish between mass and weight.
- Q4.** How does the gravitational force of attraction between two masses depend on the distance between them?
- Q5.** Define Gravitational constant.
- Q6.** What do you understand by the term force due to gravity?
- Q7.** Write down the average value of g on the earth's surface.
- Q8.** How is the acceleration due to gravity on the surface of the earth related to its mass and radius?
- Q9.** How are 'g' and 'G' related?
- Q10.** The value of g at the centre of the earth is zero. What will be the weight of a body of mass m kg at the centre of the earth?
- Q11.** Which of the following quantity does not change by change of place of a body: mass and weight?
- Q12.** Explain the meaning of the following statement ' $1\text{kgf} = 9.8\text{N}$ '.

(B) Numerical Problems:

Q1. What force, in newton, your muscles need to apply to hold a mass of 5kg in your hand? State the assumption.

Q2. State the magnitude and direction of the force of gravity acting on a body of mass 5kg. Take $g = 9.8\text{m/s}^2$

Q3. A body of mass 10 kg is taken from the earth to the moon. If the value of g on earth is 9.8m/s^2 and on moon is 1.6m/s^2 , find: (i) the weight of the body on earth, (ii) the mass and weight of the body on moon.

Q4. A body is dropped freely under gravity from the top of a tower of height 78.4m. Calculate:

- i) the time to reach the ground, and
- ii) the velocity with which it strikes the ground. Take $g = 9.8\text{m/s}^2$.

Q5. A stone at rest is dropped from a height and falls freely under gravity. Calculate the distance covered by it in the first two seconds. ($g = 9.8\text{m/s}^2$)

Q6. A body falls from the top of a building and reaches the ground 2.5s later. How high is the building? (Take $g = 9.8\text{m/s}^2$)

Q7. A ball is thrown vertically upwards. It returns 6s later. Calculate: (i) the greatest height reached by the ball, and (ii) the initial velocity of the ball. (Take $g = 9.8\text{m/s}^2$)

Q8. The weight of a body is 2.0N. What is the mass of the body? ($g = 10\text{m/s}^2$)

Q9. A man weighs 600N on earth. What would be his approximate weight on moon? Give reason for your answer?

Q10. A ball is thrown vertically upwards with an initial velocity of 49m/s. Calculate: (i) the maximum height attained, (ii) the time taken by it before it reaches the ground again. (Take $g = 9.8\text{m/s}^2$)

Q11. What is the (a) force of gravity and (b) weight of a block of mass 10.5kg? (Take $g = 9.8\text{m/s}^2$)

Q12. A ball is released from a height and it reaches the ground in 3s. If $g = 9.8\text{m/s}^2$, find :

- (a) the height from which the ball was released,

(b) the velocity with which the ball will strike the ground.

(C) Multiple choice questions :

1. The value of acceleration due to gravity of the earth:

- a) Same on equator and poles
- b) Is the least at equator
- c) Is the least on poles
- d) Increase from pole to equator.

2. The force of attraction between the two masses each of 1kg kept at a separation of 1m is:

- (a) 9.8N
- (b) 6.7N
- (c) 980 N
- (d) 6.7×10^{-11} N.

3. A body is projected vertically upward with an initial velocity u . If acceleration due to gravity is g , the time for which it remains in air, is:

- (a) u/g
- (b) ug
- (c) $2u/g$
- (d) $u/2g$.

4. The gravitational force between the two bodies is:

- (a) Always repulsive
- (b) Always attractive
- (c) Attractive only at large distances
- (d) Repulsive only at large distances.

5. An object falling freely from rest reaches ground in 2s. If acceleration due to gravity is 9.8m/s^2 , the velocity of the object on reaching the ground will be:

- (a) 9.8m/s
- (b) 4.9m/s
- (c) 19.6m/s
- (d) Zero.

END