Success Key Worksheet

Std: Class 9 (Eng & Semi) | **CH.1 Law of Motion (Worksheet-1)** | **Time: 1Hr.**

Date: | **Subject: Science -1** | **Max Marks: 20**

Q. 1 Answer the following: **(5)**

1) Fill in the blanks: **1**

The variation of velocity and time of a train in motion can be represented by _____ graph.

2) Find the odd one out: **1**

dyne, newton, watt, kg m/s²

3) Match the following: **1**

Column 'A'	Column 'B'
1) Speed zero	a) Vector quantity
2) Displacement	b) Distance
	c) acceleration
	d) body at rest

4) State 'True' or 'False', if 'False' correct it: **1**

Circular motion is an example of accelerated motion.

5) Name the following: **1**

S.I. unit of acceleration:

Q.2) Choose the correct alternative and rewrite the following: **3**

1) The force needed to produce an acceleration of 4 m/s² in a ball of mass 6 kg is _____.
(a) 1.4 N (b) 30 N (c) 24 erg (d) 24 N

2) When an object is in uniform circular motion, its _____changes at every point.
(a) displacement (b) velocity (c) speed (d) both b and c

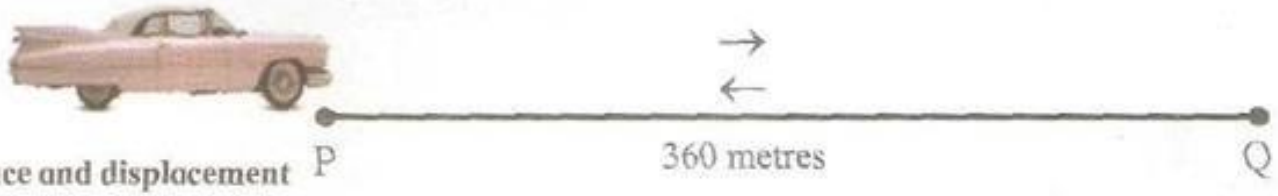
3) During collision _____remains constant.
(a) acceleration (b) mass (c) total momentum (d) displacement

Q.3) Give scientific reason of the following: (Any 1) **2**

1) Even though the magnitudes of action force and reaction force are equal and their directions are opposite, their effects do not get cancelled.
2) When an object falls freely to the ground, its acceleration is uniform.

Q.4) Answer the following: (Any 1) **2**

1) If a car, starting from point P, goes to point Q (see figure given below) and then returns to point P, how much distance has it travelled and what is its displacement?*



Distance and displacement

2) In which of the following examples can you sense motion?
How will you explain presence and absence of motion?
1. The flight of a bird
2. A stationary train
3. Leaves flying through air
4. A stone lying on a hill

Q.5) Solve the following: (Any 1) **2**

1) The mass of cannon is 500 kg and it recoils with a speed of 0.25 m/s. What is the momentum of the cannon?
2) A kangaroo can jump 2.5 m vertically. What must be the initial velocity of the kangaroo?

Q.6) Answer the following (Any 2) **6**

1) Amar, Akbar and Anthony are travelling in different cars with different velocities. The distances covered by them during different time intervals are given in the following.

Time in the clock	Distance covered by Amar in km	Distance covered by Akbar in km	Distance covered by Anthony in km
5.00	0	0	0
5.30	20	18	14
6.00	40	36	28
6.30	60	42	42
7.00	80	70	56
7.30	100	95	70
8.00	120	120	84

1. What is the time interval between the noting of distances made by Amar, Akbar and Anthony?
2. Who has covered equal distances in equal time intervals?
3. Are all the distances covered by Akbar in the fixed time intervals the same?
4. Considering the distances covered by Amar, Akbar and Anthony in fixed time intervals, what can you say about their speeds?

If an object covers equal distances in equal time intervals, it is said to moving with uniform speed.*

2) Complete the following table.

u(m/s)	a (m/s^2)	t(sec)	$v = u + at$ (m/s)
2	4	3	-
-	5	2	20

u(m/s)	a (m/s^2)	t(sec)	$s = ut + \frac{1}{2} at^2$(m)
5	12	3	-
7	-	4	92

u(m/s)	a (m/s^2)	s(m)	$v^2 = u^2 + 2as$ $(m/s)^2$
4	3	-	8
-	5	8.4	10

3) 'However, in nature force cannot act alone.' Force is a reciprocal action between two objects. Forces are always applied in pairs. When one object applies a force on another object, the latter object also simultaneously applies a force on the former object. The forces between two objects are always equal and opposite. This idea is expressed in Newton's third law of motion. The force applied by the first object is called action force while the force applied by the second object on the first is called reaction force. 'Every action force has an equal and opposite reaction force which acts simultaneously.'
1. What is a force?
2. Distinguish between action and reaction force?
3. What is the nature of forces between two objects?
4. What is Newton's third law of motion?

Success Key Worksheet

Std: Class 9 (Eng.& Semi) | **CH. 1 Law of Motion** | **Time: 1 Hr.**

Worksheet 1 (Answer key)

Date: | **Subject: Science -1** | **Max Marks: 20**

Q.1 Answer the following: **5**

1) Fill in the blanks: **1**

Ans. velocity-time

2) Find the odd one out: **1**

Ans. Dyne. All the quantities except dyne are SI units.

3) Match the following: **1**

Ans. (1) – (d), 2 – (a)

4) State 'True' or 'False', if 'False' correct it: **1**

Ans. True

5) Name the following: **1**

Ans. m/s^2

Q.2) Choose the correct alternative and rewrite the following: **3**

1)Ans. (d) 24 N

2)Ans. (b) velocity

3)Ans. (c) total momentum

Q.3) Give scientific reason of the following: (Any 1) **2**

1)Ans. i. When two forces acting on an object are equal in magnitude and opposite in direction, they cancel each other,

ii. However, action and reaction forces act on different objects. They do not act on the same object. Hence, action and reaction forces do not cancel each other even though they have equal magnitudes and opposite directions.

2)Ans. i. An object has a uniform acceleration if it travels in a straight line and its velocity increases by equal amount in equal intervals of time.

ii. When an object falls freely, the only force acting on it is the gravitational pull of the earth.

iii. When the object falls in the downward direction, it moves in a straight line and the velocity changes by uniform rate. Hence, when an object falls freely on the ground, its motion has a uniform acceleration.

Q.4) Answer the following: (Any 1) **2**

1)Ans. If the car goes to point Q from P and comes back to P then the Distance travelled = 360 x 2 = 720 m and displacement is zero.

2)Ans. We can sense motion in the following examples:

1. The flight of a bird, and

3. Leaves flying through air

When body changes its position with respect to its surroundings and at rest otherwise then it is said to be in motion.

Q.5) Solve the following: (Any 1) **2**

1)Ans. Given:

mass of the cannon = 500 kg, recoil speed = 0.25 m/s Momentum =?

Momentum = m × v = 500 x 0.25 = 125 kg m/s

2)Ans. Given:

$a = 9.8\ m/s^2$

$s = 2.5\ m$

$v = 0$

$u = ?$

$v^2 = u^2 + 2as$

$(0)^2 = u^2 + 2 \times (-9.8)\ (2.5)$ Negative sign is used as the acceleration is in the direction opposite to that of velocity.

$0 = u^2 - 49$

$u^2 = 49$

$u = 7\ m/s$

Q.6) Answer the following (Any 2) **6**

1)Ans. 1.30 minutes

2. Amar and Anthony

3. No

4. The speed of the cars of Amar and Anthony are with uniform speed since the distance covered by their cars in given time intervals are the same. But the speed of car of Akbar is non uniform as the distance covered by his car is variable.

2)Ans.

i. $v = u + at = 2 + (4 \times 3) = 14 m/s$

ii. $U = v - at = 20 - (5 \times 2) = 10\ m/s$

iii. $S = ut + ½\ at^2 = 5 \times 3 + (½ \times 12 \times 9) = 15 + 54 = 69\ m$

iv. $S = ut + ½\ at^2$

$92 = 7 \times 4 + ½\ a\ 16 = 28 + 8a$

$8a = 92-28 = 64$

$a = 8\ m/s^2$

v. $v^2 = u^2 + 2as$

$(8)^2 = (4)^2 + 2 \times 3 \times s$

$64 = 16 + 6s$

$6s = 64-16 = 48$

$s = 8\ m/s$

vi. $V^2 = u^2 + 2as$

$100 = u^2 + 2 \times 5 \times 8.4$

$u^2 = 16$

$u = 4$

3)Ans. 1. Force is a reciprocal action between two objects.

2. The force applied by the first object is called action force while the force applied by the second object on the first is called reaction force.

3. The forces between two objects are always equal and opposite.

4. Newton's third law of motion states that 'every action force has an equal and opposite reaction force which acts simultaneously.'

Success Key Worksheet

Std: Class 9 (Eng.& Semi) | **Ch.1 Law of Motion (Worksheet 2)** | **Time: 1 Hr.**

Date: | **Subject: Science -1** | **Max Marks: 20**

Q.1) Answer the following: **5**

1) Fill in the blanks: **1**

Retardation means _____ acceleration.

2) Find the odd one out: **1**

Force, Volume , Acceleration, Momentum

3) State 'True' or 'False', if 'False' correct it: **1**

Every action force has an equal and opposite reaction force.

4) Name the following: **1**

CGS unit of momentum:

5) Answer the following in one sentences: **1**

How long will an object remain at rest, according to Newton's First Law of Motion?

Q.2) Choose the correct alternative and rewrite the following: **4**

1) The working of a rocket depends on Newton's _____ law of motion.
(a) fourth (b) second (c) first (d) third

2) Slope of distance - time graph gives _____ in case of uniform motion.
(a) velocity (b) acceleration (c) displacement (d) momentum

3) The distance covered by a body in unit time is called _____.
(a) velocity (b) speed (c) displacement (d) acceleration

4) When a football is kicked, the force acting on it is _____ force.
(a) balanced (b) unbalanced (c) magnetic (d) nuclear

Q.3) Give scientific reason of the following: (Any 1) **2**

1) The velocity of an object at rest is considered to be uniform.
2) It is easier to stop a tennis ball as compared to a cricket ball, when both are travelling with the same velocity.

Q.4) Answer the following: (Any 1) **2**

1) Distinguish between Uniform and non-uniform motion.
2) "When an object is in uniform circular motion, its velocity changes at every point." Explain.

Q.5) Solve the following: (Any 1) **2**

1) A person swims 100 m in the first 40 s, 80 m in the next 40 s and 45 m in the last 20 s. What is the average speed?
2) An object moves 18 m in the first 3s, 22 m in the next 3 s and 14 m in the last 3 s. What is its average speed?

Q.6) Answer the questions in details. **5**

Take 5 examples from your surroundings and give explanation based on Newton's laws of motion.

Success Key Worksheet

Std: Class 9 (Eng.& Semi) | **Time: 1 Hr.**

Ch.1 Law of Motion

Worksheet 2 (Answer key)

Date: | **Subject: Science -1** | **Max Marks: 20**

Q.1) Answer the following: **5**

1) Fill in the blanks: **1**

Ans. negative

2) Find the odd one out: **1**

Ans. Volume. All the quantities except volume are vectors.

3) State 'True' or 'False', if 'False' correct it: **1**

Ans. True

4) Name the following: **1**

Ans. g cm/s

5) Answer the following in one sentences: **1**

Ans. An object continues to remain at rest unless an external unbalanced force acts on it.

Q.2) Choose the correct alternative and rewrite the following: **4**

1)Ans. (d) third

2)Ans. (a) velocity

3)Ans. (b) speed

4)Ans. (b) unbalanced

Q.3) Give scientific reason of the following: (Any 1) **2**

1)Ans. i. An object is said to be in a state of uniform motion, if it moves with constant speed.
ii. Object at rest has constant speed equal to 0 m/s. Hence, an object at rest can be considered to have uniform motion.

2)Ans. 1. As we know that mass of cricket ball is more that mass of tennis ball.
2. When the two balls are moving with same velocity, then momentum of cricket ball is more than tennis ball. This is because momentum is the product of mass and velocity.
3. Therefore, more force is required to stop a cricket ball than a tennis ball.

Q.4) Answer the following: (Any 1) **2**

1)Ans. Uniform motion:

i. When the object travels equal distances in equal intervals of time, then the object is said to be in uniform motion.
ii. The distance - time graph for uniform motion is a straight line.
iii. E.g. a bike running at a constant speed

Non uniform motion:

i. When an object covers unequal distances in equal intervals of time, the object is said to be in non-uniform motion.
ii. The distance - time graph for a body having non uniform motion is a curved line.
iii. E.g. Person jogging in a park

2)Ans. (i) Uniform circular motion can be described as the motion of an object in a circle at constant speed.
(ii) As an object moves in a circle, it changes its direction constantly. Therefore, its velocity changes at every point.

Q.5) Solve the following: (Any 1) **2**

1)Ans. To find: Average speed

$$\text{Formula: Average speed} = \frac{\text{Total distance covered}}{\text{Total Time taken}}$$

Given: Total distance = 100m + 80m + 45m = 225m

Total time taken = 40s + 40s + 20s = 100s

$$\text{Solution: Average speed} = \frac{\text{Total distance covered}}{\text{Total Time taken}}$$

$$= \frac{225}{100} = 2.25\text{m/s}$$

Average speed is 2.25m/s

2)Ans. Given: Total distance = 18m + 22m + 14m = 54m

Total time taken = 3s + 3s + 3s = 9s

To find: Average speed

$$\text{Total distance covered Formula: Average speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

$$= 54/9$$

Average speed is 6 m/s.

Q.6) Answer the questions in details. **5**

Ans. 1. An electric fan keeps on rotating for some time even after it is switched off. This is due to inertia of motion. When a rotating fan is switched off electric supply to it is stopped. Still it has the tendency to remain in motion. Newton's First Law explains the phenomenon of inertia.

2. Fruits on a tree fall down when its branches are shaken. (Newton's First Law)

3. A carpet is beaten up to remove dust from it. (Newton's First Law)

4. It is easier to stop a tennis ball as compared to a cricket ball when both are travelling with the same velocity. (Newton's Second Law)

5. There is a thick bed of sand for a high jumper to fall on after his jump. (Newton's Third Law)