**TOPIC-1**

Matter, Solid, Liquid, Gas; Characteristics of Solid, Liquid and Gas

### SUMMATIVE ASSESSMENT WORKSHEET-1

**Ans. 1:** Liquids have less force of attraction between molecules i.e. less mass and more volume as compared to solids.  
**(CBSE Marking Scheme, 2013) (1)**

**Ans. 2:** Particles of perfume diffuses into the air and can be smelled even at a distance.  
**(CBSE Marking Scheme, 2012) (1)**

**Ans. 3:** Oxygen < milk < salt.  
**(CBSE Marking Scheme, 2012) (1)**

**Ans. 4:**

(i) Rate of diffusion of liquids is higher because particles of liquid move freely.  
(ii) Particles of liquid have greater spaces between each other than solids.  
**(CBSE Marking Scheme, 2014) (1 + 1)**

**Ans. 5:**

(a) In minute pores of sponge air is trapped. When pressed, air is expelled out so it is compressible. It is a solid as it has definite shape and volume.  
(b) Rubber band changes shape under force and regain shape when force is removed.  
**(CBSE Marking Scheme, 2015, 2014) (2)**

**Ans. 6:**

(a) solids, particles are closely packed  
(b) solids, particles are closely packed.  
**(CBSE Marking Scheme, 2015) (1 + 1)**

**Detailed Answer:**

(a) Solids have maximum force of attraction between the particles & closely packed.  
(b) Solids have minimum spaces in between particles as the particles are closely packed.

**Ans. 7:** The physical state of matter can be changed by changing the pressure. By lowering temperature and increasing the pressure gases can be changed into liquids and some solids can be changed into gases on decreasing the pressure.

This happens with gases as there is lots of space between the particles of a gas and upon applying high pressure particles come close to each other which upon cooling gets liquified.  
**(1 + 1 + 1)**

**Ans. 8:**

(a) Sublimation, Naphthalene balls sublimate and becomes smaller in size. It is a physical change.

(b) By adding large quantities of the solvent into the solution.  
**(CBSE Marking Scheme, 2015) (1 + 1 + 1)**

**Ans. 9:**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Property</th>
<th>Solids</th>
<th>Liquids</th>
<th>Gases</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Shape</td>
<td>Definite shape</td>
<td>No definite shape, takes the shape of container</td>
<td>No definite shape, takes the shape of container</td>
</tr>
<tr>
<td>(b)</td>
<td>Volume</td>
<td>Definite volume</td>
<td>Definite volume</td>
<td>No definite volume</td>
</tr>
<tr>
<td>(c)</td>
<td>Compressibility</td>
<td>Non-compressible</td>
<td>Slightly compressible</td>
<td>Highly compressible</td>
</tr>
<tr>
<td>(d)</td>
<td>Diffusion</td>
<td>Can diffuse in liquids</td>
<td>Can diffuse in liquids</td>
<td>Can diffuse in other gases</td>
</tr>
<tr>
<td>(e)</td>
<td>Fluidity or rigidity</td>
<td>Rigid</td>
<td>Shows fluidity</td>
<td>Shows fluidity</td>
</tr>
</tbody>
</table>

(5)
**SUMMATIVE ASSESSMENT WORKSHEET-2**

**Ans. 1:** A sponge has minute holes, in which air is trapped. When we press it, air is expelled out and we are able to compress it. (CBSE Marking Scheme, 2012) (1)

**Ans. 2:** Particles of matter are very small which can be dissolved in water diffusing its smell readily in air. (CBSE Marking Scheme, 2012) (1)

**Ans. 3:** Gaseous state. (CBSE Marking Scheme, 2012) (1)

**Ans. 4:** Chemical name of dry ice is solid CO\(_2\). It just looks like ice but is absolutely different. Solid CO\(_2\) converts directly to gaseous state on decreasing pressure to one atmosphere without coming into liquid state. It is stored at high pressure. (½ + 1 + ½)

**Ans. 5:**
(a) Particles of matter are continuously moving. Rate of movement of particles increases with temperature; therefore the smell of lighted incense stick reaches us several metres away due to diffusion.
(b) Because it sublimes, due to which it directly converts into vapour and disappear without leaving any solid. (CBSE Marking Scheme, 2012) (1 + 1)

**Ans. 6:**
(a) We can liquify gases by applying pressure and reducing temperature.
(b) On a rainy day, the amount of water vapours present in air (humidity) is already high, the rate of evaporation decreases. (CBSE Marking Scheme, 2014) (1 + 1)

**Ans. 7:**
(a) Particles of matter have space between them
(b) Particles of matter are continuously moving
(c) Particles of matter attract each other (CBSE Marking Scheme, 2014) (1 × 3)

**Ans. 8:**
(a) Solids are incompressible because the particles are closely packed and there is no space for their movement.
(b) The particles of solids do not have any intermolecular space and hence no movement. Therefore, they have negligible kinetic energy. (1½ + 1½)

**Ans. 9:**
(a) (i) Gases and liquids do not have fixed shape.
(ii) Gases and liquids flow easily. (or any other relevant points)
(b) The shape does not change when pressed i.e. it is hard and rigid. It has a definite shape and has high density. (or any other relevant points)
(c) The heat energy supplied is taken up by solid particles and helps in melting or fusion. (CBSE Marking Scheme, 2013) (2 + 2 + 1)

**SUMMATIVE ASSESSMENT WORKSHEET-3**

**Ans. 1:** Water. (CBSE Marking Scheme, 2012) (1)

**Ans. 2:** Due to high speed of particles and large space between them, gases show the property of diffusing very fast. (1)

**Ans. 3:** CNG, LPG. (CBSE Marking Scheme, 2012) (1)

**Ans. 4:** A wooden chair is solid at room temperature because:
(i) it has definite shape and volume,
(ii) it cannot be compressed. (CBSE Marking Scheme, 2012) (1 + 1)
Ans. 5: (i) Level of water remains same.
(ii) A uniform mixture is formed / a true solution is obtained.
(iii) The solution becomes white in colour.
(iv) Smell can be detected even on repeated dilution. (CBSE Marking Scheme, 2012) (½ × 4)

Ans. 6: (i) Rate of diffusion: solid < liquid < gas.
(ii) Particle motion: solid < liquid < gas (CBSE Marking Scheme, 2012) 1 + 1

Ans. 7: (a) The particles of a gas are free to move randomly in all directions. During the motion they collide with each other and also with the walls of container.
(b) Particles of a gas are loosely packed, move randomly due to space between them, so they intermix with other particles present there. (CBSE Marking Scheme, 2013) (1½ + 1½)

Ans. 8: (a) Naphthalene being volatile converts from solid to gas directly by the process called sublimation. Therefore, no solid residue is left after sometime as it takes the heat from surroundings and sublimes.
(b) Particles of gas have negligible force of attraction between them and possess high kinetic energy. Therefore, they move very fast to fill the vessel completely in which they are kept. (1½ + 1½)

Ans. 9: (a) Differences between Solids and Gases:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Solids</th>
<th>Gases</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Interparticle space is small so the distance is less.</td>
<td>Interparticle space is maximum so the distance is more.</td>
</tr>
<tr>
<td>(i)</td>
<td>Interparticle force of attraction is maximum.</td>
<td>Interparticle force of attraction is minimum.</td>
</tr>
<tr>
<td>(iii)</td>
<td>Solids are rigid and non-compressible.</td>
<td>Gases are not rigid and they are compressible.</td>
</tr>
</tbody>
</table>

(b) The two factors that determine the rate of diffusion of a liquid in another liquid are:
(i) Temperature
(ii) Pressure (3 + 2)

SUMMATIVE ASSESSMENT WORKSHEET-4

Ans. 1: Potassium permanganate, Copper sulphate. (CBSE Marking Scheme, 2012) (½ + ½)

Ans. 2: Diffusion. (CBSE Marking Scheme, 2012) (1)

Ans. 3: Particles of water are held together by weak forces of attraction. It is these forces of attraction which the diver cuts through water in the swimming pool. (CBSE Marking Scheme, 2012) (1)

Ans. 4: Water is liquid at room temperature as it takes the shape of the container in which it is put and it shows fluidity. (CBSE Marking Scheme, 2012) (1 + 1)

Ans. 5: Gases are more compressible due to weak forces of attraction between molecules of gases and more intermolecular spaces. (CBSE Marking Scheme, 2012) 1 + 1

Ans. 6: (a) The whole chamber gets filled with gas.
(b) The particles move about randomly at high speed. (CBSE Marking Scheme, 2012) (2)

Ans. 7: During the interconversion of a solid into a liquid, and liquid into gas, on increasing the temperature the kinetic energy of the molecules increases and force of attraction among molecules decreases and vice versa. (CBSE Marking Scheme, 2012) (3)
Ans. 8: (a) Solid.
(b) **Sublimation**: The process of conversion of solid directly into vapours or vice-versa.
(c) Dry ice

Ans. 9: (i) The liquid is nail paint remover which contains an ether or acetone.
(ii) Ether evaporates by taking heat energy from the hand (body). That’s why she felt cold.
(iii) She exhibits knowledge, carefulness and educating nature towards her daughter.

Ans. 10: (a) (i) Take 2-3 crystals of copper sulphate and dissolve in 100 ml of water.
(ii) Take out approximate 10 ml of this solution and put it into 90 ml of clear water.
(iii) Take out 10 ml of this solution and put it into another 90 ml of clear water.
(iv) Keep diluting for 5-8 times.
**Inference**: A crystal of copper sulphate contains millions of tiny particles which keeps on dividing into smaller and smaller numbers with each dilution.
(b) Anything which possesses mass and occupies space is called matter.
   (i) Solid – strongest, (ii) Gas – weakest.
(c) The shape of each individual sugar or salt crystal remains fixed. Therefore, they are solids.
   (CBSE Marking Scheme, 2012) 2 + 1 + 1 + 1

**TOPIC-2**

**Change in State of Matter, Evaporation, Condensation, Sublimation**

**SUMMATIVE ASSESSMENT**

**WORKSHEET-5**

Ans. 1: The amount of heat energy that is required to change 1 kg of a solid into liquid at atmospheric pressure at its melting point is known as the latent heat of fusion. (CBSE Marking Scheme, 2013) (1)

Ans. 2: Water has more energy than ice at same temperature because particles in water have absorbed more energy during the change of state. (CBSE Marking Scheme, 2012) (1)

Ans. 3: False, it can occur at room temperature also. e.g., Naphthalene balls sublimes at room temperature. (1 + 1)

Ans. 4: Sublimation is the change of solid directly into the gaseous state without passing through the liquid state. e.g. ammonium chloride and naphthalene. (CBSE Marking Scheme, 2012) (1 + 1)

Ans. 5: There are pores in an earthen pot through which the liquid inside the pot evaporates. This evaporation makes the water inside the pot cool. In this way, water kept in an earthen pot becomes cool during summers. (CBSE Marking Scheme, 2015) 3

Ans. 6:

<table>
<thead>
<tr>
<th></th>
<th>Solid</th>
<th>Liquid</th>
<th>Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Density</td>
<td>Highest</td>
<td>Intermediate</td>
</tr>
<tr>
<td>(b)</td>
<td>Diffusion</td>
<td>Negligible</td>
<td>Slower</td>
</tr>
<tr>
<td>(c)</td>
<td>Particle</td>
<td>No</td>
<td>Yes, but confined</td>
</tr>
</tbody>
</table>

Ans. 7: (a) The pressure in the enclosed volume above the liquid reaches much greater values than atmospheric pressure, thus the temperature of boiling water within the cooker is greater than the normal boiling temperature. Hence, food cooks much faster.
(b) She is trying to do social work by educating village women about the usefulness of pressure cooker as faster means of cooking food.
(c) Pressure cooker helps in cooking food at faster rate, thus saves energy and time. 1 + 1 + 1
Ans. 8: (a) When particles to one substance occupy the vacant space present in the particles of the other substance, this is called diffusion.

Activity:
1. Take 5 g of copper sulphate each in three beakers.
2. Pour 100 ml of distilled water slowly in one of the beakers.
3. Cover this beaker with a watch glass.
4. Pour 100 ml of cold water in a second beaker slowly.
5. Place a third beaker containing 100 ml of water on a tripod stand for heating.
6. Observe the diffusion process which begins in all the beakers.
7. Record the time taken for the dissolution of copper sulphate in all the three cases.

Conclusion: The rate of diffusion of copper sulphate in water is in the order: Beaker 3 > Beaker 2 > Beaker 1.

(b)
(i) Liquified Petroleum Gas (LPG)
(ii) Oxygen.

SUMMATIVE ASSESSMENT WORKSHEET-6

Ans. 1: Gas: It is a stable state as compared to vapour. e.g. O₂, H₂.

Vapour: It is an unstable state. On normal cooling vapour changes into liquid state.

(CBSE Marking Scheme, 2012) (½ + ½)

Ans. 2: 100°C + 273 = 373 K
0°C + 273 = 273

(CBSE Marking Scheme, 2012) (½ + ½)

Ans. 3: Evaporation is directly proportional to surface area. Surface area of saucer is more so evaporation is more.

(CBSE Marking Scheme, 2012) (2)

Ans. 4: (a) Cotton clothes are good absorber of sweat. During evaporation of sweat, heat is lost by the body which makes us feel cool.

(b) On a hot day, evaporation of water from the pot through its pores becomes faster. During evaporation, it takes heat from the water of pot.

(CBSE Marking Scheme, 2012) (1 + 1)

Ans. 5: Latent heat

Heat is used up in changing the state by overcoming the force of attraction between the particles.

(CBSE Marking Scheme, 2015) (3)

Detailed Answer:
The temperature remains constant as the heat gets used up in changing the state by overcoming the forces of attraction between the particles.

For example, a solid melts on heating. Its temperature does not rise until the entire solid is converted into liquid. This heat energy gets hidden into the contents and is known as the latent heat.

Ans. 6: When a liquid evaporates, it draws the latent heat of vaporization from anything which it touches. Thus cause cooling.

For example: Sweating and Water in earthen pot.

(CBSE Marking Scheme, 2014) (2 + 1)

Ans. 7: (a) Evaporation is a surface phenomenon. Particles from the surface gain enough energy to overcome the forces of attraction present in the liquid and change into vapour state.

Due to wet cloth the temperature is comparatively lower than room temperature so butter does not melt when remain wrapped in wet cloths.

(b) Ice cream at 273 K, it will take latent heat from the medium to convert itself into liquid at 273 K and then into liquid at higher temperature but in water such condition is not possible.

(CBSE Marking Scheme, 2015) (5)
Ans. 8 : (a) The process of conversion of liquid state into vapour state at any temperature below the boiling point of the liquid is called evaporation.

Cotton is good absorber of water than that of Nylon. So, during summer cotton clothes absorb sweat, which on evaporation causes cooling the body.

(b) Not exactly same. Boiling of liquid takes place at its boiling point, whereas evaporation can occur at any temperature or room temperature. (CBSE Marking Scheme, 2014) 1 + 2 + 2 (5)

SUMMATIVE ASSESSMENT WORKSHEET-7

Ans. 1 : It will evaporate taking latent heat of vaporization from the palm. The hand loses heat and gets cooled leaving temperature on hand low. (CBSE Marking Scheme, 2012) (1)

Ans. 2 : 78 + 273 = 351 K (CBSE Marking Scheme, 2012) (½ + ½)

Ans. 3 : Heat energy is needed to melt a solid because there exist forces of attraction between the molecules and heat energy is essential to overcome the forces of attraction.

Latent heat of fusion is the amount of heat energy required to change 1 kg of solid into liquid at atmospheric pressure at its melting point. (CBSE Marking Scheme, 2012) (1+1)

Ans. 4 : Steam at 373 K will give more severe burns. Steam has more heat content because of latent heat of vaporization. When it touches our body it gives this extra amount of heat causing more severe burns.2

Ans. 5 : (a) The amount of heat energy required to change 1 kg of a liquid to gas at atmospheric pressure at its boiling point is called latent heat of vaporization.

(b) (i) Particles gain heat energy from the palm and evaporate causing the palm to feel cool.

(ii) When we sit under a fan during summer, rate of evaporation of sweat increases due to increase in wind speed, sweat takes heat from body to evaporate leaving us cool. (CBSE Marking Scheme, 2013) 1 + 1 + 1 (3)

Ans. 6 : (a) On increasing temperature, kinetic energy of the molecules increases and force of attraction between the molecules decreases and the state of matter changes.

(b) This is because the heat supplied to the matter is utilized in changing the state by overcoming the force of attraction. (CBSE Marking Scheme, 2012)(2 + 1)

Ans. 7 : (a) Water in the wet strips of the cloth takes heat from the body of the person while evaporating. This brings down the body temperature of the person.

(b) This shows that Ravi’s mother is caring and intelligent.

(c) Evaporation. (1 + 1 + 1)

Ans. 8 : (a) (i) Liquid and gas (ii) Liquid and solid.

(b) (i) 298 – 273 = 25°C

(ii) 300 – 273 = 27°C

(iii) 280 – 273 = 7°C 1 + 1 + 1 + 1 + 1

SUMMATIVE ASSESSMENT WORKSHEET-8

Ans. 1 : Evaporation. (CBSE Marking Scheme, 2012) (1)

Ans. 2 : $T_C < T_B < T_A$ (CBSE Marking Scheme, 2012) (1)
 Ans. 3 : (a) Spreading the clothes for drying increases the surface area which helps it to dry faster as the rate of evaporation increases with increase in surface area.

(b) \[ \text{Humidity} \propto \frac{1}{\text{evaporation}} \]

On a rainy day humidity increases, which decreases the rate of evaporation.

(CBSE Marking Scheme, 2012) (1+1)

Ans. 4 : A – Fusion
B – Vaporization
C – Condensation
D – Sublimation

\( (\frac{1}{2} \times 4) \)

Ans. 5 : (i) A – Fusion
(ii) B – Vaporization
(iii) C – Condensation
(iv) D – Solidification
(v) E – Sublimation
(vi) F – Sublimation

\( (\frac{1}{2} \times 6) \)

Ans. 6 : (a) Potassium permanganate crystals diffuse faster in hot water because as the temperature increases diffusion increases.

(b) Properties of solid: They have a fixed shape and volume. They are rigid.
Properties of liquid: They have fixed volume but not fixed shape. They are not rigid.
Properties of gas: They neither have fixed shape nor fixed volume. They are highly compressible.

(c) Archit showed his experimental and observatory skills.

\( (1 + 3 + 1) \)

Ans. 7 : (a) Particles of sugar crystals occupy the space between the particles of water.
(b) The excess heat from the body is taken by high latent heat of vaporization of water. As a result, temperature of body decreases.
(c) Sublimation, naphthalene gets converted into vapours.
(d) Because a wooden table has a fixed shape as well as fixed volume and it is uncompressible also.
(e) Evaporation of saliva causes cooling.

(CBSE Marking Scheme, 2012) (1 × 5)

PRACTICAL BASED QUESTIONS WORKSHEET-9

Ans. 1 : (a) Sugar
Ans. 2 : (a) Sodium chloride
Ans. 3 : (a) When liquid starts boiling, heat is absorbed as latent heat of vaporization.
Ans. 4 : (c) At atmospheric pressure.
Ans. 5 : (c) Both ice and water give melting point.
Ans. 6 : (b) Heat energy is supplied when solid starts melting that is absorbed as latent heat of fusion.
Ans. 7 : (a) Boiling point of water remains fixed.
Ans. 8 : (d) Temperature remains constant till all the ice melts.
Ans. 9 : (d) Temperature falls, reaches to 0°C and remains constant only as long as both ice and water exist.
Ans. 10 : (d) Temperature first increases gradually and then becomes constant due to latent heat.
Ans. 11 : Pieces of pumice stones are placed in the container before heating to avoid bumping of liquid when the temperature increase. On boiling, water releases energy as bubbles. If the bubbles do not form it can develop lot of heat and possibly explode. Addition of stones given lots of surface area for bubbles to form and release the energy gradually.

\( (2) \)

Ans. 12 : The value of the boiling point does not depend on the temperature of the liquid when pressure is kept constant. Thus, all the three students will observe same boiling point.

\( (2) \)
Ans. 13 : (i) The bulb of the thermometer should be completely inside the crushed ice.
(ii) The solution should be stirred regularly to keep a uniform temperature. 
(CBSE Marking Scheme, 2015)(1 + 1)

FORMATIVE ASSESSMENT WORKSHEET-10
Note: Students should do this activity themselves.
IS MATTER AROUND US PURE?

TOPIC-1
Elements, Compounds, Mixtures, Heterogeneous and Homogeneous Mixtures

SUMMATIVE ASSESSMENT WORKSHEET-11

Ans. 1: A substance which is made up of only a single type of particle is called a pure substance. (1)
Ans. 2: Mixtures are constituted by more than one kind of pure form of matter, i.e. pure substances. (1)
Ans. 3: A substance is a kind of matter that cannot be separated into other kinds of matter by any physical process. (1)
Ans. 4: (a) Dispersed phase and the dispersion medium. (b) Centrifugation. (CBSE Marking Scheme, 2013) (1 + 1)
Ans. 5: Difference Between True Solution and Colloids:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>True Solutions</th>
<th>Colloids</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>The particle size of solute is less than 1 nm.</td>
<td>The particle size ranges from 1 to 100 nm.</td>
</tr>
<tr>
<td>(b)</td>
<td>It is homogeneous.</td>
<td>It may appear to be homogeneous but it is heterogeneous.</td>
</tr>
</tbody>
</table>

Ans. 6: Mass % = \( \frac{\text{mass of solute}}{\text{mass of solution}} \times 100 \)
\[ = \frac{40}{40 + 100} \times 100 \]
\[ = \frac{40}{140} \times 100 = 28.57 \] (CBSE Marking Scheme, 2012) (1 + 1)

Ans. 7: (a) Sugar in water (b) Air (c) Oil in water (1 + 1 + 1)

Ans. 8: (a) Sugar is a pure substance because it cannot be separated and formed of only single type of molecule. In the case of milk it can be separated by physical process into its components. It has components like water, fat, proteins etc. (1½ + 1½)
(b) Ice and iron are pure substances as they contain particles of only one kind of matter while wood and brick contain more than one kind of matter.

Ans. 9: The concentration of a solution is the amount of solute present in a given amount (mass or volume) of solution, or the amount of solute dissolved in a given mass or volume of solvent. (1)
Two ways of expressing the concentration of a solution:
(i) Mass by mass percentage of a solution = \( \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100 \)
(ii) Mass by volume percentage of solution = \( \frac{\text{Mass of solute}}{\text{Volume of solution}} \times 100 \) (1 + 1)

SUMMATIVE ASSESSMENT WORKSHEET-12

Ans. 1: Milk is a mixture of water, fat and proteins. (1)
Ans. 2: Water and sugar. (1)
Ans. 3: Homogeneous mixtures and heterogeneous mixtures.  

Ans. 4: Mass% = \( \frac{\text{mass of solute}}{\text{mass of solution}} \times 100 \)  
\[ = \frac{50}{50 + 350} \times 100 = 12.5\% \]  
(CBSE Marking Scheme, 2012) (1 + 1)

Ans. 5: Reasons:  
(a) Heterogeneous mixture  
(b) Particles can be seen with the naked eye  
(c) Scatter a beam of light  
(d) Unstable  
(e) Can be filtered.  
(CBSE Marking Scheme, 2012) (Any four) ½ × 4

Ans. 6: Tincture of iodine: Iodine (solute) and alcohol (solvent),  
Aerated drinks: \( \text{CO}_2 \) (solute) and water (solvent).  
(CBSE Marking Scheme, 2012) 1+1

Ans. 7: Mercury is the only liquid metal and bromine is the only liquid non-metal. Two gaseous non-metals are hydrogen and nitrogen.  

Ans. 8:  

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Mixture</th>
<th>Compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Elements or compounds just mix together to form a mixture and no new compounds is formed.</td>
<td>Combination of two or more elements.</td>
</tr>
<tr>
<td>2.</td>
<td>Variable composition.</td>
<td>Composition of new substance is always fixed.</td>
</tr>
<tr>
<td>3.</td>
<td>Shows the properties of the constituent substances.</td>
<td>New substance has totally different properties.</td>
</tr>
<tr>
<td>4.</td>
<td>Constituents can be separated fairly easily by physical methods.</td>
<td>Constituents can be separated by only chemical or electrochemical reaction.</td>
</tr>
</tbody>
</table>

(Any three) (1 × 3)

Ans. 9:  

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Solutions</th>
<th>Suspension</th>
<th>Colloids</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Stability</td>
<td>Stable</td>
<td>Unstable</td>
</tr>
<tr>
<td>(b)</td>
<td>Filterability</td>
<td>Cannot be filtered</td>
<td>Can be filtered</td>
</tr>
<tr>
<td>(c)</td>
<td>Tyndall effect</td>
<td>Do not show tyndall effect</td>
<td>Do not show tyndall effect</td>
</tr>
</tbody>
</table>

(CBSE Marking Scheme, 2014) 1 × 3

Ans. 10: (a) (i) By increasing the temperature/by heating the solution.  
(ii) By increasing the amount of solvent

(b)  

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Homogeneous Mixture</th>
<th>Heterogeneous Mixture</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Uniform composition.</td>
<td>Non-uniform composition.</td>
</tr>
<tr>
<td>(b)</td>
<td>No distinct boundaries of separation, e.g., sugar + water.</td>
<td>Distinct boundaries of separation, e.g., sand + water.</td>
</tr>
</tbody>
</table>

(2 + 3)

SUMMATIVE ASSESSMENT WORKSHEET-13

Ans. 1: A mixture that has uniform composition throughout its mass is called a homogeneous mixture.  
Ans. 2: A mixture that does not have uniform composition throughout its mass is called a heterogeneous mixture.  
Ans. 3: A homogeneous mixture of two or more substances is called a solution.
Ans. 4: (i) Metalloids are the elements which have intermediate properties between metals and non-metals.
(ii) Boron, silicon and germanium. (any two) (CBSE Marking Scheme, 2012) (1 + 1)

Ans. 5:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Air</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Variable composition.</td>
<td>Definite composition i.e. 2 atoms of hydrogen and 1 atom of O.</td>
</tr>
<tr>
<td>(b)</td>
<td>Constituents can be separated by simple physical methods</td>
<td>Cannot be separated into its constituents by physical methods.</td>
</tr>
</tbody>
</table>

(CBSE Marking Scheme, 2012) (1 + 1)

Ans. 6: (i) The two components of a solution are solute and solvent.
(ii) The solution is stable, particles of solution are very small in size, smaller than 1 nm. (CBSE Marking Scheme, 2012) (1 + 1)

Ans. 7: (a) Pure substances contain only one kind of particles or two or more particles in a fixed ratio while impure substance contain more than one kind of particles.
(b) (i) No reaction,
(ii) Evolution of gas. (2 + 1)

Ans. 8: (a) Differences between Metals and Non-Metals:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Metal</th>
<th>Non-Metals</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>They have lustre.</td>
<td>They are not lustrous.</td>
</tr>
<tr>
<td>(ii)</td>
<td>They are ductile.</td>
<td>They are non-ductile.</td>
</tr>
<tr>
<td>(iii)</td>
<td>They are malleable.</td>
<td>Non-malleable.</td>
</tr>
<tr>
<td>(iv)</td>
<td>Conduct heat and electricity.</td>
<td>Poor conductors of heat and electricity.</td>
</tr>
<tr>
<td>(v)</td>
<td>They are sonorous.</td>
<td>They are non-sonorous</td>
</tr>
</tbody>
</table>

(any four)

(b) Metalloids: Some elements have intermediate properties between those of metals and non-metals. e.g. Boron/Silicon etc.
(c) Sodium and mercury are metals. (2 + ½ + ½)

Ans. 9: Metals, non-metal, metalloids. Metals have lustre / conduct heat / ductile / malleable / sonorous / conduct electricity etc. Non-metals have variety of colours / poor conductors of heat and electricity etc.

Ans. 10: (a) (i) It is heterogeneous mixture.
(ii) Particles of colloids scatter a beam of light. (Tyndall effect)
(iii) It is stable.
(b) Dispersing medium and dispersed phase.
(c) Ink, Blood, Foam. (3 + 1 + 1)

SUMMATIVE ASSESSMENT WORKSHEET-14

Ans. 1: Vinegar (acetic acid + water). (1)
Ans. 2: A solution of sugar and water. (1)
Ans. 3: Brass (an alloy having 70% copper and 30% zinc). (1)

Ans. 4:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Colloids</th>
<th>Dispersed phase</th>
<th>Dispersing Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Fog</td>
<td>Liquid</td>
<td>Gas</td>
</tr>
<tr>
<td>(b)</td>
<td>Cheese</td>
<td>Liquid</td>
<td>Solid</td>
</tr>
</tbody>
</table>

(CBSE Marking Scheme, 2012) (1 + 1)
Ans. 5: Brass and air – mixture, Gold – element, Hydrogen sulphide – compound. (½ × 4) (CBSE Marking Scheme, 2012)

Ans. 6: Concentration of a solution is the amount of the solute present in a given amount (mass or volume) of solution (or solvent). Dissolve 10 g of sugar in (100 – 10) = 90 g of water. (CBSE Marking Scheme, 2012) (1 + 1)

Ans. 7: Milk of magnesia - Sol, Smoke- Aerosol, Cheese - Gel, Mist - Aerosol, Mud- Sol, Butter - Gel. (CBSE Marking Scheme, 2012) (½ × 6)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Property</th>
<th>Soda water</th>
<th>Milk</th>
<th>Muddy water</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Homogeneity</td>
<td>Homogeneous</td>
<td>Heterogeneous</td>
<td>Heterogeneous</td>
</tr>
<tr>
<td>(b)</td>
<td>Filtration</td>
<td>Cannot be separated</td>
<td>Cannot be separated</td>
<td>Cannot be separated</td>
</tr>
<tr>
<td>(c)</td>
<td>Tyndall effect</td>
<td>Does not show</td>
<td>Shows</td>
<td>Shows</td>
</tr>
</tbody>
</table>

(CBSE Marking Scheme, 2012) (½ × 6)

Ans. 8: (a) Chromatography.
(b) Different colours get separated due to dissolution in the same solvent and different rates of rising due to different rates of absorption.
(c) Awareness, caring attitude for the family, skillful person. (CBSE Marking Scheme, 2013) (1 + 1 + 1)

Ans. 9: (a) Centrifugation’s Principle: Denser particles are forced to the bottom and the lighter particles stay at the top when spun rapidly.
(b) Used in dairies to separate butter from cream.
(c) Multiple use of the available resources to avoid wastage. (1 + 1 + 1)

TOPIC-2 Separation techniques, Physical and Chemical change

SUMMATIVE ASSESSMENT WORKSHEET-15

Ans. 1: When a bar magnet is brought closer to the mixture of iron filings and sulphur powder, iron particles stick to the magnet, while in case of iron sulphide no change will be observed. When a mixture of iron and sulphur is added to carbon disulphide, sulphur dissolves while in case of iron sulphide no dissolution takes place. (CBSE Marking Scheme, 2012) (1 + 1)

Ans. 2: (a) Iron sulphide
(b) Hydrogen sulphide gas
   Properties—
   (i) It is colourless.
   (ii) It has the smell of rotten eggs. (CBSE Marking Scheme, 2014) (1 + 1 + 1)

Ans. 3: (a) Centrifugation’s Principle: Denser particles are forced to the bottom and the lighter particles stay at the top when spun rapidly.
(b) Used in dairies to separate butter from cream.
(c) Multiple use of the available resources to avoid wastage. (1 + 1 + 1)
Ans. 4: The process of separating alcohol and water is as follows:

- Take the mixture in a distillation flask.
- Fit it with a thermometers.
- Arrangement of the apparatus is done as shown in the below given figure.
- Heat the mixture slowly keeping a close watch at the thermometer.
- The alcohol vapourises, condenses in the condenser and can be collected from the condenser outlet.
- Water is left behind in the distillation flask.

Ans. 5: (a) Ammonium chloride changes directly from solid to gaseous state on heating. So, to separate mixtures containing a sublimable volatile component from a non-sublimable impurity i.e., sodium chloride, the sublimation process is used.

- Place the china dish over a wire gauze placed over a tripod stand.
- Cover the china dish with an inverted glass funnel and plug in a little cotton at the opening stem.
- On heating the mixture, white fumes evolve.
- Stop heating when the fumes stop rising and allow the funnel to cool.
- On cooling, remove the funnel and transfer the solid ammonium chloride sticking on the walls of funnel to a watch glass.

(b) Camphor and naphthalene.
Ans. 1: By distillation. (1)

Ans. 2: When the insoluble component is separated by filtering the solution through a medium or membrane it is called filtration. (1)

Ans. 3: (a) Chromatography, (b) Centrifugation, (c) Distillation, (d) Separating funnel (CBSE Marking Scheme, 2012) (½ × 4)

Ans. 4: (i) Firstly the mixture will be heated. As camphor is sublimable, it will vapourize and so it can be separated through sublimation.

(ii) To separate mixture of common salt and soil, we will dissolve them in water. As salt is soluble in water, and soil is not soluble in water, soil can be separated through filtration.

(iii) At the end, we get salt solution. Salt can be separated from water by evaporation. (3)

OR

Camphor + Common salt + Soil

↓ Sublimation

Camphor sublimes

Common salt + soil

↓ Add water

Salt dissolves, filter soil as residue

Salt Evaporation

(CBSE Marking Scheme, 2014) (3)

Ans. 5: (a) Process: Using separating funnel.

(b) Stop Cock

Water

Oil

Separating funnel

Stop Cock

(CBSE Marking Scheme, 2012) (1 + 2)

Ans. 6: (a) Curiosity, good analytical skills.

(b) The tiny particles were particles of dust and smoke.

(c) Tyndall effect. (1 + 1 + 1)

Ans. 7: (a) Sugar remains as residue in the form of a solid mass.

(b) Potassium chloride crystallises out.

(c) A black coloured compound is formed.

(d) The path of the light becomes visible.

(e) A colourless gas is evolved. (CBSE Marking Scheme, 2014) (1+ 1+ 1+ 1+ 1)
Ans. 8: (a) Separating funnel  
(b) Sublimation  
(c) Evaporation  
(d) Filtration / using magnet  
(e) Centrifugation  

(SOLUTIONS) (CBSE Marking Scheme, 2014) (1 + 1 + 1 + 1 + 1)

SUMMATIVE ASSESSMENT WORKSHEET-17

Ans. 1: By fractional distillation.  

Ans. 2: Chromatography is used for the separation of those solutes that dissolve in the same solvent.  

Ans. 3: (i) Tyndall effect.  
(ii) In the forest, the mist contains tiny droplets of water which acts as particles of colloid suspended in air.  
(iii) Milk.  

Ans. 4: When no more solute can be dissolved in the solution at a given temperature then the given solution is saturated. On cooling, crystals of solute separate out from the solution.  

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Simple distillation</th>
<th>Fractional distillation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>By simple distillation, we can separate two miscible liquids having sufficient difference in their boiling points.</td>
<td>By fractional distillation, we can separate a mixture of two or more miscible liquids for which the difference in the boiling points is less than 25°C. A fractionating column is fitted in between the distillation flask and the condenser for the process.</td>
</tr>
<tr>
<td>(ii)</td>
<td>It is done by using an air condenser or a water condenser.</td>
<td></td>
</tr>
</tbody>
</table>

E.g., Different gases from air are separated by fractional distillation.  
(CBSE Marking Scheme, 2012) (2 + 1)

Ans. 6:  
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Physical change</th>
<th>Chemical change</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>No new substance is formed.</td>
<td>A new substance is formed.</td>
</tr>
<tr>
<td>(ii)</td>
<td>Only physical properties of matter change. Example: Melting of wax.</td>
<td>Chemical properties of substance change. Example: Burning of wax.</td>
</tr>
</tbody>
</table>

One example in which both physical and chemical change take place is burning of a candle. (2 × 1)

Ans. 7:  
(a) It is a homogeneous mixture.  
(b) It is used as a preservative and used in the preparation of Chinese food.  
(c) It is not harmful as it is a very dilute acid.  

Ans. 8:  
(a) Physical change: reversible change, chemical composition do not change, no new substance is formed.  
Chemical change: irreversible change, chemical composition changes, new substance is formed.  
(Any two differences)  
Example–Tearing a paper–physical change  
Burning a match stick–chemical change  

(b) (i) Metals are malleable and good conductors of heat.  
(ii) Metals are ductile and good conductors of electricity.  

(CBSE Marking Scheme, 2014) (3 + 2)
Detailed Answer:

(a) Difference between physical and chemical changes:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Physical change</th>
<th>Chemical change</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>These are reversible changes and their chemical composition do not change.</td>
<td>These are irreversible changes and the chemical composition also changes.</td>
</tr>
<tr>
<td>(ii)</td>
<td>No new substance is formed. e.g. Tearing of paper.</td>
<td>New substance is formed. e.g. Burning a match-stick.</td>
</tr>
</tbody>
</table>

Ans. 9: (a) Separating funnel is to separate immiscible liquids: The mixture is taken in a separating funnel and the mixture is allowed to stand for some time. On standing, the liquid with higher density forms the lower layer whereas the liquid having lower density forms the upper layer. Then the two liquids are taken out from the separating funnel in separate conical flasks.

(b) It separates immiscible liquids of different densities.

(c) 

(d) It is used to separate oil from water and carbon disulphide from water. (2 + 1 + 1 + 1) (CBSE Marking Scheme, 2012)

SUMMATIVE ASSESSMENT WORKSHEET-18

Ans. 1: By crystallization. (1)

Ans. 2: Purification of salt that we get from sea water. (1)

Ans. 3: (a) No. (1)

(b) Crystals of salt and sugar will appear. This is because solubility of a solid decreases with decrease in temperature. (½ + ½)

Ans. 4: Student C has prepared the desired solution

\[ \text{Mass by Volume (\%)} = \frac{\text{Mass of solute} \times 100}{\text{Volume of solution}} \]

\[ = \frac{50 \times 100}{100} = 50\% \] (2)
Ans. 5: (i) Boiling: It is the process of conversion of a liquid into its vapours.
(ii) The volatile solvent from its non-volatile solute.
(iii) Ink is a mixture of dyes in water.  

(CBSE Marking Scheme, 2012) (1 + 1 + 1)

Ans. 6: Distillation is a process employed to obtain pure liquid from its solution. It can be defined as the conversion of impure liquid into vapours by evaporation and then condensation of the vapours to get pure liquid.

This method is generally used for the separation of components of a mixture containing two miscible liquids that boil without decomposition and their boiling points are quite different (more than 25-30°C).

Ans. 7: (i) (a) Filtration.
(b) Sedimentation and Decantation.
(c) Separating funnel.
(d) Evaporation.
(e) Sublimation.
(f) Winnowing.

(ii) (a) Water boils to form steam: Physical change.
(b) Burning of paper: Chemical change.
(c) An almirah gets rusted: Chemical change.
(d) Making a fruit salad with raw fruits: Physical change.  

(½ × 6 + ½ × 4)

PRACTICAL BASED QUESTIONS  WORKSHEET-19

Ans. 1: (a) I  
(1)

Ans. 2: (c) a homogeneous mixture is formed.  
(1)

Ans. 3: (d) reddish brown coloured copper is formed.  
(1)

Ans. 4: (b) II is a mixture i.e. formed of two or more components.  
(1)

Ans. 5: (c) Both are homogeneous.  
(1)

Ans. 6: (c) White precipitate is barium sulphate.

\[ \text{BaCl}_2 (aq) + \text{Na}_2\text{SO}_4 (aq) \rightarrow \text{BaSO}_4 (s) + 2 \text{NaCl} (aq) \]  
(1)

Ans. 7: (c) Correct observation.  
(1)

Ans. 8: Particles of a suspension are visible to the naked eye. Suspension is a heterogeneous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of medium. It is unstable as the solute particles settle down when it is left undisturbed.  

(2)
Ans. 9: When the sodium chloride is dissolved in a beaker with distilled water, a true transparent solution is obtained. When starch is dissolved in distilled water, a translucent colloid is formed. Lastly, when chalk powder is dissolved, an opaque suspension is formed.

FORMATIVE ASSESSMENT  WORKSHEET-20

Note: Students should do this activity themselves.
**TOPIC-1**

Cell as a basic unit of life, Prokaryotic and Eukaryotic cell, Multicellular organisms

**SUMMATIVE ASSESSMENT WORKSHEET-21**

**Ans. 1:** Vacuoles. (1)

**Ans. 2:** Many cells are visible only under a microscope e.g., Mycoplasma is the smallest cell and longest cell in human body is nerve cell or neuron. (CBSE Marking Scheme, 2014) (2)

**Ans. 3:** (a)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Nuclear region of bacterial cell</th>
<th>Nuclear region of an animal cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Poorly defined and lacks any covering.</td>
<td>Well defined and membrane bound.</td>
</tr>
<tr>
<td>(ii)</td>
<td>Has single chromosome.</td>
<td>Has more than one chromosome.</td>
</tr>
<tr>
<td>(iii)</td>
<td>Lacks true organelles.</td>
<td>Well defined membrane bound cell organelles present.</td>
</tr>
</tbody>
</table>

(b) Chromosomes bear ‘genes’. (2 + 1)

**Ans. 4:** (a) 1 – Cell wall, plasma membrane, 2 – Nucleoid, 3 – Cell wall

(b) (i) Lack nuclear membrane.
(ii) Lack cytoplasmic organelles.
(iii) Chlorophyll is associated with membranous vesicles. (CBSE Marking Scheme, 2012) (½ × 6)

**Ans. 5:** Differences between plant cells and animal cells:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Plant Cells</th>
<th>Animal Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Plant cells are larger in size.</td>
<td>Animal cells are comparatively smaller in size.</td>
</tr>
<tr>
<td>2.</td>
<td>They contain cell wall made of cellulose, which is present outside the plasma membrane.</td>
<td>Cell wall is absent.</td>
</tr>
<tr>
<td>3.</td>
<td>They contain plastids, i.e., chloroplast, leucoplast and chromoplast.</td>
<td>Plastids are absent.</td>
</tr>
<tr>
<td>4.</td>
<td>Centrosome is absent.</td>
<td>Centrosome is present.</td>
</tr>
<tr>
<td>5.</td>
<td>Larger vacuoles are present.</td>
<td>Vacuoles either absent or very small in size.</td>
</tr>
<tr>
<td>6.</td>
<td>Food is stored in the form of starch.</td>
<td>Food is stored in the form of glycogen.</td>
</tr>
<tr>
<td>7.</td>
<td>Lysosomes either absent or very few in number.</td>
<td>More number of prominent lysosomes are present.</td>
</tr>
</tbody>
</table>

(any 5) (1 × 5)

**SUMMATIVE ASSESSMENT WORKSHEET-22**

**Ans. 1:** Amoeba and Euglena. (½ + ½)

**Ans. 2:** Nucleus is called the control centre of the cell as it controls all the metabolic activities going in the cell directly or indirectly and also in formation of various cell organelles by controlling the synthesis of proteins. (2)
Ans. 3:

Golgi vesicles
ribosome
smooth ER
(no ribosomes)
nucleus
rough ER
(endoplasmic reticulum)
large central vacuole
amyloplast
(starch grain)

(cell wall
membrane
Golgi
apparatus
chloroplast
vacuole
membrane
riphide
crystal
druse
crystal
mitochondrion
cytoplasm)

(any 4 labelling) \((1 + \frac{1}{2} \times 4)\)

Ans. 4:

pinocytotic
vesicle
lysosome
golgi
vesicles
rough ER
(endoplasmic reticulum)
smooth ER
(no ribosomes)
cell (plasma) membrane
mitochondrion
golgi
apparatus
nucleus
nucleolus
microtubules
centrioles (2)
Each composed of 9 microtubule triplets
cytoplasm
ribosome

(any 4 labellings) \((1 + \frac{1}{2} \times 4)\)

Ans. 5:

A plant cell consists of:

1. **Cell wall**: The outermost covering made mainly of non-living cellulose which gives distinct shape to the cell.

2. **Plasma membrane**: It is also called cell membrane. It is a thin, delicate and elastic covering lying inner to the cell wall. It controls the entry and exit of selected molecules and ions, and is selectively permeable.

3. **Cytoplasm**: It is a viscous, homogeneous colloidal liquid and consists of a number of living and non-living structures. The living structures are the cell organelles and include structures like mitochondria, endoplasmic reticulum, Golgi apparatus, lysosomes, vacuoles etc. Cytoplasm keeps the cell fully expanded and provides turgidity to the cell. Chloroplasts are present only in the cytoplasm of plant cell.

4. **Nucleus**: It is a dense spherical body bounded by a membrane which is called nuclear membrane. A number of thread-like structures called chromosomes with genes on them are embedded within the nuclear sap. The nucleus controls the various metabolic activities of the cell and so is called the control centre of the cell.

\((1 \times 4 + 1)\)

For diagram Refer Ans. No. 3.
SUMMATIVE ASSESSMENT

WORKSHEET-23

Ans. 1: Prokaryotic cells do not have a well defined nuclear region known as nucleoid where as Eukaryotic cells have a well defined nucleus.

½ + ½

Ans. 2: Difference between Prokaryotic and Eukaryotic cell:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Prokaryotic cell</th>
<th>Eukaryotic cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Size : generally small (1-10 µm) 1 µm = 10^{-6} m.</td>
<td>Size : generally large (5-100 µm)</td>
</tr>
<tr>
<td>2.</td>
<td><strong>Nuclear region</strong> : containing only nucleic acid and is undefined due to the absence of nuclear membrane and known as nucleoid.</td>
<td><strong>Nuclear region</strong> : well defined and surrounded by a nuclear membrane.</td>
</tr>
<tr>
<td>3.</td>
<td><strong>Chromosome</strong> : single.</td>
<td><strong>Chromosome</strong> : more than one chromosome</td>
</tr>
<tr>
<td>4.</td>
<td>Membrane-bound cell-organelles absent.</td>
<td>Membrane bound cell organelles (e.g., chloroplasts, golgi bodies etc.) present.</td>
</tr>
</tbody>
</table>

(any 3) (1 × 3)

(CBSE Marking Scheme, 2012)

Ans. 3:

Bacterial flagellum
Cytoplasm
Ribosomes
Capsule
DNA (Nucleoid)
Plasma membrane

(any 4 labelling) (1 + 2)

Ans. 4: (a) Because shape and size of cells are related to specific functions they perform. Cells constitute various components of plants and animals.
(b) Because it permits exit and entry of some selected materials in and out of the cells.
(c) Amount of substance dissolved in water or solute concentration.

(1 + 1 + 1)

(CBSE Marking Scheme, 2012)

(ii) (a) Mitochondria, (b) Ribosome, (c) Nucleus,
(iii) 1. Cell wall and, 2. Plastids

(¼ × 10 + ½ × 5)

SUMMATIVE ASSESSMENT

WORKSHEET-24

TOPIC-2
Cell wall, Cell membrane, Cell organelles – Structure and Functions, Chromosomes – basic structure and number

Ans. 1: Chromoplast.
(1)

Ans. 2: They store starch, oils, protein granules.
(CBSE Marking Scheme, 2015) (1)

Ans. 3: Rober Hooke.
(CBSE Marking Scheme, 2014) (1)
Ans. 4: Adenosine Triphosphate. It is produced in mitochondria. (CBSE Marking Scheme, 2014) (½ + ½)

Ans. 5: Endoplasmic reticulum is a membranous network enclosing a fluid-filled lumen. The two types of endoplasmic reticulum are Rough Endoplasmic Reticulum (RER) and Smooth Endoplasmic Reticulum (SER). RER has ribosomes attached to its surface. The ribosomes take part in protein synthesis. SER does not have any ribosomes on it and secretes lipids. Some proteins and lipids synthesised in ER are used for producing new cellular parts, specially the cell membrane, by biogenesis. (CBSE Marking Scheme, 2014) (½ + 1 + ½)

Ans. 6: Ribosomes is a cell organelle that lacks membrane. It is prepared in the nucleolus. (1 + 1) (CBSE Marking Scheme, 2014)

Ans. 7: Shrinkage of protoplast from the cell wall in presence of hypertonic solution due to exosmosis is known as plasmolysis.

When a plasmolysed cell is placed in water, the concentration of water in the outside medium is more than the concentration in the cell. Hence, water moves inside the cell leading to its swelling. (1 + 1)

Ans. 8: (a) Because of its affinity for DNA and RNA, methylene blue will produce a darker stain leading the DNA in the nucleus to stand out so that nucleus can be clearly seen.

(b) On boiling, all the cells of rheo leaves become dead. On adding sugar syrup nothing will happen as liquid cannot pass through dead cell membrane.

(c) On placing RBCs in concentrated solution, the water will come out and the cell will shrink as the concentration of solution outside is higher than inside the cell. As a result of osmosis, water comes out of the cell to maintain equilibrium. (1 + 1 + 1)

Ans. 9: (i) Chromosomes are present in the nucleus of a cell. Their chemical composition is of DNA, RNA and proteins.

(ii) Humans have 23 pairs of chromosomes. (2 + 1)

Ans. 10: (a) (i) When a cell possess higher water concentration than the surrounding medium then exosmosis occurs in the cell due to difference in concentration and cell shrinks.

(ii) When a cell has low water concentration than surrounding medium then endosmosis occurs that results in the swelling of the cell.

(iii) A cell having equal water concentration to its surrounding medium will not show any changes.

(b) Cell wall is composed of cellulose and cell membrane is composed of lipids and proteins. (3 + 2)

SUMMATIVE ASSESSMENT WORKSHEET-25

Ans. 1: The process through which an amoeba acquires its food from the external environment is endocytosis. (CBSE Marking Scheme, 2014) (1)

Ans. 2: The smooth endoplasmic reticulum helps in the manufacture of fats or lipids important for cell function and building cell membrane. (1)

Ans. 3: Mitochondria; as energy is released from it. (½ + ½)

Ans. 4: Plasma membrane also called as cell membrane, is the outer covering of a cell that separates its contents from the surrounding medium. It is made up of lipids and proteins, and provides a mechanical barrier to protect the inner contents of the cell. It encloses the nucleus and cytoplasm of the cells. (1 + ½ × 2)

Ans. 5: The different parts found inside the cell are called cell organelles. They perform specific functions and together carry out the various metabolic activities of the cell. (2)

Ans. 6: Cellulose is the main component of a plant cell. It is a polysaccharide and is responsible for providing structural strength to the plants. (1 + 1)
Ans. 7: (i) Cellulose provides rigidity to the plant cell and helps it to withstand in dilute medium.
(ii) Folds in mitochondria increase the surface area to help in ATP generating reactions.
(iii) Digestive enzymes in lysosomes help in removal of viruses, worn out organelles, damaged cell.

Ans. 8: (i) On cell division, chromatin network organise themselves into chromosomes.
(ii) Chloroplast is a plastid which contains a green pigment called chlorophyll which is responsible for photosynthesis.
(iii) The segments of DNA are called genes.

Ans. 9: (i) (a) Endocytosis: The flexibility of the cell membrane enables the cell to engulf food and other materials from its external environment. Such process is known as endocytosis.
(b) Plasmolysis: When a living plant cell loses water through osmosis, there is shrinkage or contraction of the contents of the cell away from the cell wall. This phenomenon is known as plasmolysis.
(ii) When the organisation of a cell gets damaged, lysosomes will burst and their enzymes will eat up their own cell organelles. Therefore, lysosomes are also known as the suicidal bags of the cell.
(iii) Gases like CO₂ and O₂ move in and out of the cell by diffusion from their higher concentration to lower concentration. Water enters the cell by endosmosis through semi-permeable plasma membrane from its higher concentration to lower concentration.

Similarly, water moves out of the cell by exosmosis when a cell is placed in a hypertonic solution.

Ans. 1: Chromosome is the carrier of genetic information.

Ans. 2: Lysosomes.

Ans. 3: Mitochondria and chloroplast.

Ans. 4: (a) Nucleoid (b) Mitochondria.

Ans. 5: | S. No. | Vacuoles in plant cells | Vacuoles in animal cell |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>They are comparatively very large in size.</td>
<td>They are comparatively smaller in size.</td>
</tr>
<tr>
<td>2.</td>
<td>They are few in number.</td>
<td>They are comparatively more in number.</td>
</tr>
<tr>
<td>3.</td>
<td>They contain cell sap and provide turgidity and rigidity to the cell.</td>
<td>They may contain food and are called food vacuoles. In some cases they become specialised to expell out excess of water and wastes, like in amoeba.</td>
</tr>
</tbody>
</table>

Ans. 6: Vacuoles are clear fluid filled or gas filled spaces in the cytoplasm. A vacuole is covered by a covering called tonoplast. In plant cells, the vacuoles are larger and less in number as compared to the animal cells. Vacuoles help in the storage of water, food and other waste substances.

Ans. 7: (1) Ribosomes: It helps in protein synthesis.
(2) Vacuole: Vacuoles are full of cell sap and provide turgidity and rigidity to the cell in plants.
(3) Plasma membrane: It allows or permits the entry and exit of some materials in and out of the cell. It prevents movement of some other materials not required or harmful for cells.

Ans. 8: (i) Both are double membrane structures.
(ii) Mitochondria is the site of production of energy whereas plastid is the site of production of food.
Ans. 9: Each cell has got certain specific components within it known as cell organelles. Each cell organelle performs a special function. A cell is able to live and perform all its functions perfectly because of these organelles. This is called division of labour. All cells are found to have the same organelles, no matter what their function is or in which organism they are found. (CBSE Marking Scheme, 2012) (3)

Ans. 10: (a) The thread shaped structures in the nucleus are known as chromosomes. These are important because they contain information for inheritance of features from parents to the next generation.

(b) 

![Diagram of a nucleus with labeled parts]

Nuclear envelope
Nucleolus
Nuclear pores
Chromosome

(1 + 1 + 3)

SUMMATIVE ASSESSMENT WORKSHEET-27

Ans. 1: Plasmolysis. (CBSE Marking Scheme, 2012) (1)

Ans. 2: They will respectively shrink or burst. (CBSE Marking Scheme, 2012) (1)

Ans. 3: Cellulose. It provides structural strength to plant. (CBSE Marking Scheme, 2012) (½ + ½)

Ans. 4: A centrosome contains micro cylindrical bodies called centrioles. It is located near the nucleus and is present in animal cell only. It initiates and regulates cell division. It is involved in spindle formation during the cell division. (1 + 1)

Ans. 5: The chromatin material mainly consists of deoxyribonucleic acid (DNA) which stores and transmit the hereditary information from one generation to another. (1 + 1)

Ans. 6: (i) Nucleoplasm, a liquid ground substance.

(ii) Chromatin material, which is a network of DNA protein fibres which carry genes, that carry the genetic information from one generation to the next.

(iii) Nucleolus, which lies in the centre and helps in the formation & storage of RNAs as well as in the formation of ribosomes.

(2)

Ans. 7: Rough endoplasmic reticulum looks rough under a microscope because it has particles called ribosomes attached to its surface and smooth endoplasmic reticulum do not have ribosomes attached to it. It helps in the manufacture of fat molecules or lipids important for cell function. Some of these proteins and lipids help in the building of cell membrane, the process called membrane biogenesis. (CBSE Marking Scheme, 2012) (2 + 1)

Ans. 8: Leucoplasts are colourless plastids. They store starch, oil, proteins. Chromoplasts are coloured plastids. They contain pigments. e.g. Chloroplasts contain green pigment present in the plant cell. Chromoplasts provide colour to various flowers and fruits. (CBSE Marking Scheme, 2012) (1 + 1 + ½ + ½)

Ans. 9: (i) Osmosis is the movement of water from the region of its higher concentration (pure water or dilute solution) to the region of its lower concentration, when the two are separated by a semipermeable membrane. When external water enters the cell it is known as Endosmosis.

(ii) Cell membrane is semi permeable membrane for water, ions, sugar, amino acids etc. These substances pass through the plasma membrane by an active process so it is called selectively permeable.

(iii) Ravi showed curiosity and skillfulness towards knowledge. (1 + 1 + 1)
Plasma membrane is the selectively permeable membrane that surrounds the cell and allows the entry and exit of selected materials into and out of the cell. If it ruptures, the contents of the cell will come in direct contact with the surrounding medium and not only unwanted material will be able to enter freely into the cell, but useful material will also find its way out of the cell easily. This will seriously disrupt the various metabolic activities of the cell and will result in its eminent death.

(b) If there were no Golgi apparatus, the material synthesized by Endoplasmic reticulum would not be carried to the various parts inside and outside the cell. Also as the Golgi apparatus performs the function of storage and modification of the material synthesized in the cell, these material could not be stored and modified further.

Moreover, there will be no production of lysosomes which will cause the accumulation of waste material, viz. worn out and dead cell organelles within the cell which will ultimately lead to cell death.

**SUMMATIVE ASSESSMENT**

**WORKSHEET-28**

**Ans. 1 :** Chloroplast.  
(CBSE Marking Scheme, 2012) (1)

**Ans. 2 :** Smooth Endoplasmic Reticulum.  
(CBSE Marking Scheme, 2012) (1)

**Ans. 3 :** Chloroplast and mitochondria.  
(CBSE Marking Scheme, 2012) (½ + ½)

**Ans. 4 :** Mitochondria have their own DNA and ribosomes, due to which they are able to make some of their own proteins and are semi-autonomous.  
(2)

**Ans. 5 :** The nucleus plays the central role in Cellular reproduction. Cellular reproduction is the process by which a single cell divides and forms two new cells. Apart from that, the nucleus also plays a vital role in determining the way the cell will develop and what form it will at maturity, (by directing the chemical activities of the cell) attain.  
(2)

**Ans. 6 :** Differences between cell wall and cell membrane:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Cell wall</th>
<th>Cell membrane</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>It is present only in plant cell.</td>
<td>It occurs both in animal cells and plant cells.</td>
</tr>
<tr>
<td>2.</td>
<td>It is dead in nature and permeable.</td>
<td>It is a living membrane and is semi-permeable.</td>
</tr>
<tr>
<td>3.</td>
<td>It is composed of cellulose.</td>
<td>It is composed of lipids and proteins.</td>
</tr>
</tbody>
</table>

(any 2) (1 + 1)

**Ans. 7 :** Camillo Golgi.
Lysosomes.

Functions:
(i) Packages and dispatches materials synthesised by ER.
(ii) Complex sugar made from simple sugars.
(iii) Involved in formation of Lysosomes.  
(any two) (1 + 1 + 1)

**Ans. 8 :**
(i) In beaker A, the raisins would swell because water concentration is higher outside the cell membrane. So more water enters the membrane than leaves it.

In beaker B, raisins will shrink because water concentration is less outside the cell membrane. So more water comes out of the membrane than enters.

(CBSE Marking Scheme, 2012) (1 + 1 + 1)

**Ans. 9 :**
(a) Mitochondria is associated with ATP production. It has own DNA and ribosomes to make proteins.
(b) The egg shrinks because water passes out of the egg solution, into the salt solution due to osmosis.  
(CBSE Marking Scheme, 2012) (1½ + 1½)

**Ans. 10 :**
(i) Clothes are washed with soap or detergent solution. This solution is hypertonic as compared to osmotic concentration of our skin cells. The washing solution, therefore, causes exosmosis in the skin cells that come in contact with it for sometime. Because of it, the skin over the fingers shrinks while washing clothes for a longtime.
(ii) Sheela was worried because her fingers had shrunk. But she didn’t know that after sometime her fingers will come back to their original shape.

PRACTICAL BASED QUESTIONS

**Ans. 1 : (b)** (No prominent vacuoles are present in cheek cell while onion cell has a large vacuole present at centre. Stain colour obtained in cheek cell is of blue while that of onion cell is pink.)

**Ans. 2 : (d)** Cell wall

**Ans. 3 : (b)** B

**Ans. 4 : (c)** sclerenchyma

**Ans. 5 : (a)** (Experimental requirement)

**Ans. 6 : (b)** (experimental truth)

**Ans. 7 : (d)** This is the correct identification.

**Ans. 8 :**

\[
\begin{align*}
\text{Mass of dried raisin} & = 2.0 \text{ g} \\
\text{Mass of dried raisins after soaking} & = 3.5 \text{ g} \\
\text{Mass of water absorbed} & = 3.5 - 2.0 = 1.5 \text{ g} \\
\text{Percentage of water absorbed} & = \frac{1.5}{2.0} \times 100 \\
& = 75\%
\end{align*}
\]

One precaution for this experiment is to keep the raisins inside the water, not on the surface.

**Ans. 9 : (i)** Student (I).

(ii) \( w_2 \) is the mass of raisin after soaking and \( w_1 \) is the mass of dried raisin.

(CBSE Marking Scheme, 2015)

FORMATIVE ASSESSMENT

**Note**: Students should do this activity themselves.
SUMMATIVE ASSESSMENT WORKSHEET-31

Ans. 1: Apical meristem. (CBSE Marking Scheme, 2014) (1)

Ans. 2: Sieve tubes, companion cells, phloem parenchyma and phloem fibres. (1)

Ans. 3: Xylem and phloem. (½ + ½)

Ans. 4: Meristematic tissue and permanent tissue. (1)

Ans. 5: Strip of secondary meristem replaces the epidermis of the stem. Cells on the outside are cut off from this layer which forms the cork. (CBSE Marking Scheme, 2015) (2)

Ans. 6: (a) A group of cells that are similar in structure and work together to achieve a particular function is called a tissue. Blood is a cluster of similar cells and they perform same function in the body, hence blood is a tissue. (½ + ½)

(b) (i) Apical meristem, (ii) Intercalary meristem. (CBSE Marking Scheme, 2013) (½ + ½)

Ans. 7: Apical meristems are the meristematic tissues which are found at the growing tips of stems and roots. It increases the length of the stems and roots and is responsible for the growth of plant. (1 + 1) (CBSE Marking Scheme, 2013)

Ans. 8: The main adaptation of desert plants is to minimise the water loss. Hence, layer of cutin is present on epidermis, which is a thick waxy coating. This waxy coating helps in minimising water loss by transpiration. (CBSE Marking Scheme, 2012) (2)

Ans. 9: M – Chloroplast, N – Nucleus, O – Cytoplasm, P – Intercellular space. (½ × 4) (CBSE Marking Scheme, 2012)

Ans. 10: (a) Phloem.

(b) ‘A’–Sieve plate, ‘B’–Sieve tube, ‘C’–Phloem parenchyma, ‘D’–Companion cell. (1 + 2)

Ans. 11: (a) (i) In desert habitat, protection against water loss is essential.

(ii) The waxy covering aids in protecting the plant against loss of water, mechanical injury and invasion by parasitic fungi.

(b) Epidermis is the outermost covering of cells in plants. It is usually made up of a single layer of cells. On aerial parts of a plant epidermal cells often secrete a waxy, water resistant layer on their outer surface to prevent loss of water from plant. The cells of epidermis are present in a continuous layer without intercellular spaces. Small pores are present on the epidermis of leaf. These pores are called as stomata, which help in gaseous exchange and transpiration. As the plant grows older, a strip of secondary meristem replaces the epidermis of stem and forms a thick cork. (2 + 3)

OR

(a) (i) In such habitat, protection against water loss is essential.

(ii) Protecting against water loss, mechanical injury.

(b) Cells are elongated, flattened, closely packed. No intercellular spaces and form a continuous layer. (CBSE Marking Scheme, 2013) 5
SUMMATIVE ASSESSMENT WORKSHEET-32

Ans. 1: Meristematic tissue is capable of dividing and is found in the developing regions of the plant. (1)

Ans. 2: Three namely—apical, lateral (cambium) and intercalary. (1)

Ans. 3: When meristematic tissues lose their ability to divide and become permanent in shape, size and function, the process is called differentiation. (1)

Ans. 4: When the cells take up a specific role and lose their ability to divide. (1)

Ans. 5: Cutin.

**Advantages**: Waterproof quality and protection against loss of water, mechanical injury, invasion by parasitic fungi. (any three) (½ × 4)

Ans. 6: It consists of relatively unspecialized cells with thin cell walls. They are usually loosely packed so that large spaces are present between the cells. (CBSE Marking Scheme, 2012) (any two) 1 + 1

Ans. 7: Cells of cork are dead and compactly arranged without intercellular spaces. They also have a chemical called suberin in their walls which make them impervious to gases and water. 1 + 1

(CBSE Marking Scheme, 2012)

Ans. 8:

<table>
<thead>
<tr>
<th>Parenchyma</th>
<th>Collenchyma</th>
</tr>
</thead>
<tbody>
<tr>
<td>thin primary cell wall</td>
<td>irregularly thickened primary cell wall</td>
</tr>
</tbody>
</table>

Ans. 9: (a) Non-living
(ii) Compactly arranged
(iii) No intercellular spaces
(iv) Multilayered
(v) Contains suberin (any two)

A strip of secondary meristem replaces the epidermis. Cells on the outside are cut forming cork. Protection, makes the plant impervious to gases prevents loss of water, prevents mechanical injury or infection. (CBSE Marking Scheme, 2014) (2 + 1)

Ans. 10:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Meristematic tissue</th>
<th>Permanent tissue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Cells are living.</td>
<td>Cells can be living or dead.</td>
</tr>
<tr>
<td>3.</td>
<td>Main function is to bring about growth.</td>
<td>Performs various type of functions.</td>
</tr>
</tbody>
</table>

Ans. 11: (a) Xylem conducts water in the plant body.
Phloem transports food in the plant body.
(b) COMPONENTS OF XYLEM

![Diagram of xylem components]

VESSELS- vessel elements
TRACHEIDS

 Ans. 12 : (i) Meristematic tissue.
(ii) Apical meristem, lateral meristem, intercalary meristem.
(iii) Apical meristem increases the height of the plant.
Intercalary meristem increases the length of organs.
Lateral meristem increases the girth of stem.  

(CBSE Marking Scheme, 2013) (1 + 1 + 3)

SUMMATIVE ASSESSMENT WORKSHEET-33

Ans. 1 : Cork is obtained from the bark of a tree i.e., oak plant’s stem.  

(CBSE Marking Scheme, 2012) 1

Ans. 2 : Stomata are the small pores present in the epidermis of leaf.  

(CBSE Marking Scheme, 2012) 1

Ans. 3 : Stomata are enclosed by two kidney-shaped cells which are called guard cells.  

(CBSE Marking Scheme, 2012) 1

Ans. 4 : Xylem and phloem.  

(CBSE Marking Scheme, 2012) 1

Ans. 5 : Characteristic features of parenchyma tissue : 
(1) have isodiametric cells.
(2) The cells are arranged in such a way that they possess intercellular space.
(3) They have thin cell walls.  

(any 2 features) (CBSE Marking Scheme, 2012) (1 + 1)

Ans. 6 : Living component common to xylem and phloem tissues is parenchyma. Its function is to store food and help in sideways conduction of water in xylem and food in phloem.  

(CBSE Marking Scheme, 2012) 2

Ans. 7 : Sclerenchymatous tissue.
The cells are dead with long and narrow walls thickened due to lignin.  

(CBSE Marking Scheme, 2012) 1 + 1

Ans. 8 : Parenchyma tissue : In this, cells are found with thin cell walls and are usually loosely packed so that large intercellular spaces are found.
Sclerenchyma : Cells are dead and cell wall is thickened due to lignin. It provides strength to plants.  

(CBSE Marking Scheme, 2012) 1 + 1

Ans. 9 : (i) Parenchyma, (ii) Collenchyma.  

(CBSE Marking Scheme, 2012) 1 + 1

Ans. 10 : (a) Lateral meristem : for increase in growth of plant parts.
(b) Intercalary meristem : for formation of leaves, branches etc.
(c) Apical meristem : increases length of the stem and the root.  

(CBSE Marking Scheme, 2012) 1½ + 1½

Ans. 11 : Consists of tracheids, vessels, parenchyma and xylem fibres.
(i) Transport of water and minerals vertically.
(ii) Parenchyma stores food.
(iii) Fibres provide support.  

(CBSE Marking Scheme, 2012) (1½ + 1½)
Ans. 12: (i) The epidermis protects all parts of the plants.
(ii) Epidermal cells on the aerial part of the plant often secrete a waxy, water resistant layer which helps in protection against water loss and mechanical injury.
(iii) Protect against invasion of parasitic fungi. (CBSE Marking Scheme, 2012) (1 × 3)

Ans. 13: (i) Epidermis plays a protective role. It protects all the external parts of a plant against loss of water.
(a) In some desert plants, the epidermis has a thick waxy coating of cutin that prevents water loss from the plants.
(b) Epidermal cells on the aerial parts of the plant secrete a waxy, water resistant layer, on the outer surface that helps in protection against loss of water and mechanical injury.
(ii) Dendrite receives impulses in neuron. (2 + 2 + 1)

TOPIC-2
Structure and Functions of Animal Tissues

SUMMATIVE ASSESSMENT WORKSHEET-34

Ans. 1: (i) Epithelial tissue-squamous epithelium
(ii) Nervous tissue (½ + ½)

Ans. 2: (i) Involuntary muscles, (ii) Ligament (CBSE Marking Scheme, 2014) (½ + ½)

Ans. 3: (a) Plasma, (b) WBC, (c) Platelets, (d) RBC. (½ × 4)

Ans. 4: Plants are stationary thus their supportive tissue is made up of dead cells. Animals move, hence they possess living cells to provide energy for movement. Also, for the many more differences and functions in plants and animals, they are made up of different tissues. (CBSE Marking Scheme, 2014) 2

Ans. 5: (a) Tendons: Connect bones to muscles.
(b) Ligaments: Connect two bones. (1 + 1)

Ans. 6: The nervous tissue is made up neurons which consists of a cell body with a nucleus and cytoplasm, from which long thin hair-like parts arise. On stimulation, the nerve cells transmit the stimulus very rapidly from one place to another within the body. Nervous tissues are located in the brain, spinal cord and nerves. (1 + 1 + 1)

Ans. 7: (a) Xylem and phloem tissues
(b) Columnar epithelium
(c) Cuboidal epithelium
(d) Involuntary muscular tissues
(e) Cardiac muscles
(f) Unstriated muscular tissue (CBSE Marking Scheme, 2014) (½ × 6)
Ans. 8: All cells of our body look different in terms of shape, size as well as structure as they are needed for different functions at different parts of the body.

Cells in our body have no demarcation on the basis of dividing and non-dividing tissue. Cells special-ised in one function are often grouped together in the body.

Example: Heart muscle cells show rhythmic contraction and relaxation are cylindrical and branched. Also, the nerve cell is a long 'string' shape in order to stretch to connect to other neurons.

**SUMMATIVE ASSESSMENT WORKSHEET-35**

Ans. 1: (i) It helps in storage of fats. ½
(ii) It act as an insulator. ½

Ans. 2: Simple epithelial tissue is unilaminar while compound epithelial tissues is multilaminar. (1)

Ans. 3: (a) Attached to limb bones and helps in their movement.
(b) (i) Presence of light and dark bands.
(ii) Multinucleated.
(iii) Cylindrical and unbranched. (any two) (CBSE Marking Scheme, 2012) (1 + 1)

Ans. 4: Functions of epithelial tissue in human body:
(i) Covering of the organs.
(ii) Regulates exchange of materials between the body and the external environment.
(iii) Glands present in them help in various secretions. e.g., sweat, oil etc. (any two) (1 + 1) (CBSE Marking Scheme, 2012)

Ans. 5: (i) Cardiac muscles.
(ii) Smooth muscles or unstriated muscles.
(iii) Striated muscles. (CBSE Marking Scheme, 2012) 1 × 3

Ans. 6: (a) Bone (Connective tissue)
(b) Cartilage (Connective tissue)

Bone:
(i) It has a hard matrix.
(ii) They are usually hollow.
Cartilage:
(i) This tissue is elastic and harder but softer than bone.
(ii) The matrix of cartilage is solid but elastic.

<table>
<thead>
<tr>
<th>Ans. 7 : (a) Differences between tendon and ligament :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tendon</strong></td>
</tr>
<tr>
<td>1. They join bone to muscles.</td>
</tr>
<tr>
<td>2. They have limited flexibility.</td>
</tr>
<tr>
<td>3. They have more strength.</td>
</tr>
</tbody>
</table>

(b) Adipose tissue stores fat and provides insulation.

Ans. 7 : (b) (any two)

Ans. 8 : (a) Sumeet’s brother was suffering from ligament tear which needs immediate treatment because continued athletic activity can cause devastating consequences resulting in massive cartilage damage that might lead to an increased risk of developing osteoarthritis later in life.

(b) Sumeet shows caring nature towards his brother.

Ans. 9 : (a) Sieve Tubes, companion cells, parenchyma, phloem fibre.

(b) Creates an efficient pumping action of heart.

(c) Tendon

| **Tendon** | **Ligament** |
| (i) It connects muscles to bones. | It connects bone to bone. |
| (ii) It is tough and non elastic. | It is strong but elastic. |

(d) (i) Squamous epithelium

(ii) Scleroid.

e) Adipose tissue stores fat and acts as an insulator.

SUMMATIVE ASSESSMENT WORKSHEET-36

Ans. 1 : Stratified squamous epithelium.

Ans. 2 : Stratified squamous epithelium.

Ans. 3 : (a) Tendon, (b) Squamous epithelium, (c) Adipose tissue, (d) Xylem.

Ans. 4 : (i) It carries O₂ and CO₂ to various parts of the body and lungs.

(ii) It transports food to various body parts.

(iii) It transports hormones as well as metabolic wastes.

(iv) It has a major role to play in the regulation of body temperature.

Ans. 5 : (i) Oesophagus, lining of mouth.

(ii) Lining of kidney tubules, ducts of salivary glands.

Ans. 6 :

Function : Beating of heart.
Ans. 7: (a) For labelled diagram see Q.1 in short Answer type question.
(b) Epidermal cells of the plants are useful in protection against loss of water, mechanical injury or invasion by parasitic fungi. (2 + 1)

Or
(a) Refer textbook ncert diagram page no. 78 (fig. 6.12) Each correct labeling (Cell body, dendrite, axon and nerve ending) Diagram three labelling.
(b) Epidermal cells of the plants are useful in protection against loss of water; mechanical injury or invasion by parasitic fungi. (CBSE Marking Scheme, 2013) (3) (any two)

Ans. 8: (a) Muscular tissue.
(b) Walking is an important physical activity by which men/women can maintain their health. It increases blood circulation and energy consumption which helps in weight loss. (1 + 2)

Ans. 9: (i) columnar (ii) adipose (iii) ciliated columnar (iv) aerenchyma (v) squamous. (CBSE Marking Scheme, 2014) (1 × 5)

SUMMATIVE ASSESSMENT WORKSHEET-37
Ans. 1: Shark fish. (1)
Ans. 2: Transportation of oxygen and carbon dioxide and pH constancy. (1)
Ans. 3: (a) Ligament (b) Cartilage. (CBSE Marking Scheme, 2012) (1 + 1)
Ans. 4: It is found below the skin. It acts as an insulator. (CBSE Marking Scheme, 2012) (1 + 1)
Ans. 5: Bone matrix: Calcium and phosphorus.
Cartilage matrix: Sugar and proteins. (CBSE Marking Scheme, 2012) 1 + 1
Ans. 6: (i) (a) Tendon
(b) Adipose tissues
(c) Phloem
(d) Collenchyma
(ii) (a) It prevents loss of water by evaporation.
(b) It protects plant from the invasion of parasites and harmful micro-organisms. (2 + 1)
Ans. 7: Tissue ‘A’: Adipose tissue, Present just below epithelium.
Tissue ‘B’: Cardiac muscle, Present in heart. (CBSE Marking Scheme, 2012) (1½ + 1½)
Ans. 8: (a) Sclerenchyma tissue.
(b) Sclerenchyma provides mechanical strength to the plants and also supports them.
(c) Sclerenchyma fibres are of great economical importance, since they constitute the source material for many fabrics like flax, hemp, jute etc. (1 + 1 + 1)
Ans. 9: (a) Connective, (b) Plasma, (c) RBCs, (d) Platelets, (e) Neutrophil, (f) Eosinophil, (g) Lymphocyte, (i) Monocyte and (j) Bone or ligament or tendon. (CBSE Marking Scheme, 2014) ½ × 10

SUMMATIVE ASSESSMENT WORKSHEET-38
Ans. 1: About 120 days. (1)
Ans. 2: It helps in the exchange of materials between blood and body cells. (1)
Ans. 3: Blood.
Composition:
(i) RBC (red blood corpuscles),
(ii) WBC (white blood corpuscles) and
(iii) Platelets. (CBSE Marking Scheme, 2012) (½ + 1½)
Ans. 4: (i) Like other connective tissues, blood consists of living cells scattered in an abundant matrix. The matrix is liquid or plasma in blood.

(ii) Blood circulates throughout the body, receiving and providing materials to all tissues and organs of the body. It thus connects all parts of the body. (1 + 1)

Ans. 5: (i) Blood: Transport of materials such as gases, waste, digested food etc.
(ii) Bone: Supporting framework of the body.
(iii) Ligament: Connects two bones together.
(iv) Tendon: Connects bone to muscle. (CBSE Marking Scheme, 2012) (any three) (1 × 3)

Ans. 6: Cross-striations

Cardiac muscles

Nuclear

Striped muscles

Function: Striated muscles help in body movement. (1 + 1 + 1)

Ans. 7: Plant tissue culture has widespread use in scientific research. It has commercial as well as agricultural use. Some uses are:
(i) It is widely used in forestry and in floriculture. Rare and endangered species of plants can also be conserved by this technology.
(ii) Large scale growth of plant cells is done by this technology. Large production of plant cells is used for production of valuable compounds, biopharmaceuticals etc.
(iii) Large number of identical individuals can be made for commercial advantages.
(iv) Inter specific hybrids can be made by this technique.
(v) Clean plant material can be achieved from diseased stock. (5)

Ans. 8: Differences between striated, unstriated and cardiac muscles:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Striated muscles</th>
<th>Unstriated (Smooth) muscles</th>
<th>Cardiac muscles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>They are found in limbs, tongue, pharynx etc.</td>
<td>They are present in the wall of visceral organs.</td>
<td>They form the heart.</td>
</tr>
<tr>
<td>2.</td>
<td>Long, cylindrical with blunt ends.</td>
<td>Short, spindle shaped with pointed ends.</td>
<td>Short, branched and cylindrical with flat ends.</td>
</tr>
<tr>
<td>3.</td>
<td>Multinucleate, nuclei peripheral.</td>
<td>Uninucleate, nucleus in the centre.</td>
<td>One or two nuclei in the centre.</td>
</tr>
<tr>
<td>4.</td>
<td>They are voluntary in action.</td>
<td>They are involuntary in action.</td>
<td>They are involuntary in action.</td>
</tr>
<tr>
<td>5.</td>
<td>Dark and light bands are present.</td>
<td>No bands present.</td>
<td>Bands present.</td>
</tr>
</tbody>
</table>
PRACTICAL BASED QUESTIONS

Ans. 1 : (a) Striated. (1)
Ans. 2 : (c) Living cells with thin wall and intercellular spaces. (1)
Ans. 3 : (b) Thickness of cell wall. (1)
Ans. 4 : (b) Striated muscle fibres are long and cylindrical and possess light and dark bands. (1)
Ans. 5 : (a) Nucleus of the striated muscles is oval shaped. (1)
Ans. 6 : (a) Thin walled living cells with cellulose cell wall and intercellular spaces. (1)
Ans. 7 : (b) Collenchyma is present in leaf stalks below the epidermis, these cells are thickened at corners to reduce the intercellular spaces, making them compactly arranged. (1)
Ans. 8 : Sclerenchyma cells are dead, as their walls are thickened due to lignin, a chemical substance, which acts as cement and hardens them. (2)
Ans. 9 : (i) The cells of the parenchyma tissue remain turgid and provide rigidity or support to softer parts. (1 + 1)
(ii) Parenchyma present in xylem and phloem takes part in some lateral movement of materials.
Ans. 10 : Safranin is a reddish pink solution mostly used in laboratory for staining plant sections. Safranin makes the various parts of plant section appear very clearly. (2)
Ans. 11 : Two types of processes present in neuron are —
(i) **Axon** : It carries impulses away from the cell body. (1 + 1)
(ii) **Dendrite** : It carries impulses towards the cell body.
Ans. 12 : Unstriated or smooth muscles are called involuntary muscles because we cannot stop or move them according to our will. Smooth muscles are uninucleate whereas striated muscles are multinucleate. (1 + 1)

FORMATIVE ASSESSMENT

Note : Students should do this activity themselves.
SUMMATIVE ASSESSMENT WORKSHEET-41

Ans. 1:  A passenger travelling in a bus is at rest with respect to fellow passengers but it is in motion with respect to the bus. (1)

Ans. 2:  A car travelling in a straight road increases its speed by unequal amounts in equal intervals of time. (1)

Ans. 3:  A freely falling object. (CBSE Marking Scheme, 2015) (1)

Ans. 4:  Balanced, because when we press the ball, an equal and opposite force is developed changing the in shape of ball. (CBSE Marking Scheme, 2015) (2)

Ans. 5:  

Distance from velocity - time graph can be calculated by finding the area beneath the graph. (2)

Ans. 6:  

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Speed</th>
<th>Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>Speed is defined as the rate of change of distance.</td>
<td>Velocity is the rate of change of displacement.</td>
</tr>
<tr>
<td>(ii)</td>
<td>Speed is a scalar quantity.</td>
<td>It is a vector quantity.</td>
</tr>
<tr>
<td>(iii)</td>
<td>Speed may or may not be equal to velocity.</td>
<td>A body may possess different velocities but the same speed.</td>
</tr>
<tr>
<td>(iv)</td>
<td>Speed can never be negative or zero.</td>
<td>Velocity can be negative, zero or positive.</td>
</tr>
</tbody>
</table>

Ans. 7:  Speed is the distance travelled by an object in a given time. Its SI unit is m/s. Velocity is the speed of an object moving in a definite direction. SI unit of velocity is same as speed i.e. m/s. As the motion of the body is uniform the velocity remains constant i.e. 15 m/s even after 10 s (acceleration is also zero). (1 + 1 + 1)

Ans. 8:  If we divide the total distance travelled on a car trip by the time for the trip, we are calculating the average speed.

The average speed and the average velocity are same when the object travels in a straight line and in one direction.

Since, 

\[
\text{average speed} = \frac{\text{Total distance travelled}}{\text{Total time taken}}
\]

\[
\text{average velocity} = \frac{\text{Net Displacement}}{\text{Total time taken}}
\]

The magnitudes of both will be equal when the total distance travelled is equal to displacement. This happens when an object moves in straight line and in unidirectional motion. (3)
SUMMATIVE ASSESSMENT WORKSHEET-42

Ans. 1: Average speed = \( \frac{16 + 16}{4 + 2} = \frac{32}{6} = 5.33 \text{ m/s} \) (CBSE Marking Scheme, 2014) (1)

Ans. 2: PR

(\(Q\))

(\(P\))

(\(R\))

(CBSE Marking Scheme, 2014) (1)

Ans. 3: No. It measures its instantaneous speed. (1)

Ans. 4: Uniform Velocity: An object with uniform velocity covers equal distances in equal intervals of time in a specified direction e.g., an object moving with speed of 40 km h\(^{-1}\) towards west has uniform velocity.

Non-uniform Velocity: When an object covers unequal distances in equal intervals of time in a specified direction, or if the direction of motion changes, it is said to be moving with a non-uniform or variable velocity. e.g., revolving fan at a constant speed has variable velocity. (1 + 1)

Ans. 5: Instantaneous velocity is the velocity of a body at any particular instance during its motion. For example, the instantaneous velocity of a motor-cycle at a particular instance is 40 kmh\(^{-1}\) if it is moving at 40 km h\(^{-1}\) at that particular instance. It is measured by the speedometers on the vehicles. (2)

Ans. 6: If the velocity of an object changes by unequal amounts in equal intervals of time, the object is said to be in non-uniform or variable acceleration e.g., if the speed of a bus travelling along a straight road increases by unequal amounts, then the bus is moving with non-uniform acceleration. (2)

Ans. 7: (a) Speed
(b) Displacement
(c) Acceleration (CBSE Marking Scheme, 2014) (1 + 1 + 1)

Ans. 8: 3600 m, 0 m, south (CBSE Marking Scheme, 2014) (3)

Detailed Answer:
Total distance he covered = 700 m + 300 m + 400 m + 600 m + 1200 m + 300 m + 100 m

His displacement was zero as he returned back to the point of start.

**Ans. 9:**
(a) Impossible,
(b) Possible,
**Reason:** When an object is thrown upward, at the highest point its velocity becomes zero for a slice of time, but its acceleration (g) remains due to attraction of gravity.
(c) Impossible,
(d) Possible,
**Reason:** When a moving car applies the break its velocity decreases. The acceleration is against the direction of motion of the car.
(e) Possible,
**Reason:** Acceleration has a negative value only when velocity and displacement are in opposite direction and acceleration has a positive value only when velocity and displacement are in same direction.

\[1 \times 5\]

**OR**

(a) Impossible, reason
(b) Possible, reason
(c) Impossible, reason
(d) Possible, reason
(e) Possible, reason

(CBSE Marking Scheme, 2014)

---

**SUMMATIVE ASSESSMENT**

**WORKSHEET-43**

**Ans. 1:** Path 1.

(CBSE Marking Scheme, 2013) \(1\)

**Ans. 2:** A body is said to be in motion if it changes its position with respect to a reference point.

\(1\)

**Ans. 3:** When its position changes with time.

\(1\)
Ans. 4: If the velocity of a body decreases with time, then its final velocity is less than the initial velocity and thus its acceleration is negative. Negative acceleration is called retardation or de-acceleration.

For example, when brakes are applied to a moving truck, its velocity gradually decreases. In other words, it is under retardation.

Ans. 5: The characteristics of distance-time graph for an object moving with uniform speed are:

(i) It is always a straight line.

(ii) The uniform speed of the moving object is equal to the slope of the straight line plotted.

Ans. 6: (i) Acceleration = AB

(ii) Retardation = CD

(iii) \( s = \text{Area of } \triangle AEB \)

\[ = \frac{1}{2} \times 4 \times 4 = 8 \text{ m}^2 \]

Ans. 7: Velocity: Rate of displacement.

Acceleration: Rate of change of velocity.

Yes, when the body is just released, \( u = 0 \)

but \( g = 10 \text{ m/s}^2 \)

Ans. 8:

From a velocity-time graph, we can find out:

(i) The velocity of a body at any instance of time.

(ii) The acceleration of the body, and

(iii) The total distance travelled by the body in a given time-interval.
Ans. 1: We infer the motion of air by observing the movement of dust particles or leaves and branches of trees, or simply by feeling the blowing air on our face. (1)

Ans. 2: We need to specify a reference point, called the origin. (1)

Ans. 3: Motion in a straight line. (1)

Ans. 4: Linear speed in uniform circular motion

\[ \text{Motion} = \frac{\text{circumference}}{\text{time}} = \frac{2\pi r}{t} \]

Given: \( r = 42,260 \text{ km} \), \( t = 24 \text{ h} \)

\[ \Rightarrow v = \frac{2 \times 3.14 \times 42260}{24} \]
\[ = 11058.03 \text{ km/hr} \] (2)

Ans. 5: (a) The position of the particle is

\[ x = 2 \text{ m} \quad \text{[when it is at P_1]} \]
\[ x = -2 \text{ m} \quad \text{[when it is at P_2], (½ + ½)} \]

(b) The two positions are not same as they are in different directions. (½)

(c) The distances of the particle from the origin in the two positions are same and is equal to 2 metres. (½)

Ans. 6: The path travelled by a body is called distance.

Displacement is the shortest distance between initial and final points.

![Diagram of a circle with a path AB]

\[ 2\pi r = 176 \]
\[ \Rightarrow 2 \times \frac{22}{7} \times r = 176 \]
\[ r = 28 \text{ m} \]

After 6 min, the body would have covered \( \frac{11}{2} \) rounds.

Hence if it begins its motion from A, it will reach till B after 6 min.

Total displacement after 6 min

\[ = AB = 28 \times 2 = 56 \text{ m} \] (1 + 1 + 1)

(CBSE Marking Scheme, 2012)

Ans. 7: Graph:

Distance \( s = \text{area under the graph} \)

\[ = \frac{1}{2} \times 5 \times 5 = 12.5 \text{ m}^2 \] (2 + 1)

(CBSE Marking Scheme, 2012)
Ans. 8: (a) (i) Distance covered by the body is directly proportional to time.
(ii) Not directly proportional to time.
(b) Distance is the length of actual path travelled between initial and final position whereas the displacement is the shortest path between the initial and final position of the particle.
(c) Initial velocity \( u = 90 \text{ km/h} = 25 \text{ m/s} \),
Final velocity \( v = 0 \), acceleration \( a = 0.5 \text{ m/s}^2 \)
Distance travelled \( s = ? \)
From \( v^2 = u^2 + 2as \)
\[ s = \frac{(0 - 25 \times 25)}{(-2 \times 0.5)} = 625 \text{ m} \] (CBSE Marking Scheme, 2012) (2 + 1 + 2)

**SUMMATIVE ASSESSMENT WORKSHEET-45**

**Ans. 1:** They are relative terms. (1)
**Ans. 2:** Yes. An object may be at rest related to one object and at the same time it may be in motion related to another object. (1)
**Ans. 3:** The phenomena like coming of day and night indicate the motion of the earth. (1)
**Ans. 4:** If the distance decreases with time then motion is called non-uniform motion. Slope of the graph will be negative.

**Ans. 6:** (a) (i) Uniform motion.
(ii) Uniform circular motion
(b) 
\[ V = \frac{2\pi r}{t} = \frac{2}{7} \times \frac{36000}{24 \times 60 \times 60} \]
\[ = 2.62 \text{ km/s} \] (CBSE Marking Scheme, 2012) (1 + 1 + 1)

**Ans. 7:**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Distance</th>
<th>Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Distance is the length of the actual path covered by an object, irrespective of its direction of motion.</td>
<td>Displacement is the shortest distance between the initial and final positions of an object in a given direction.</td>
</tr>
<tr>
<td>2.</td>
<td>Distance is a scalar quantity.</td>
<td>Displacement is a vector quantity.</td>
</tr>
<tr>
<td>3.</td>
<td>Distance covered can never be negative. It is always positive or zero.</td>
<td>Displacement may be positive, negative or zero.</td>
</tr>
<tr>
<td>4.</td>
<td>Distance between two given points may be same or different for different paths chosen.</td>
<td>Displacement between two given points is always the same.</td>
</tr>
</tbody>
</table>
SUMMATIVE ASSESSMENT WORKSHEET-46

Ans. 1: It is accelerated, as its velocity changes due to change in direction.

Ans. 2: The velocity-time graph for non-uniformly accelerated motion can have any shape.

Ans. 3: Velocity-time graph of an object that moves under uniform acceleration.

Equation for position-velocity relation: From the graph, the distance travelled by the object in time \( t \), moving under uniform acceleration \( a \) is given by the area enclosed within the trapezium OABC under the graph. That is,

\[
S = \text{Area of the trapezium OABC} = \frac{(OA + BC) \times OC}{2}
\]

Substituting \( OA = u \), \( BC = v \) and \( OC = t \), we get

\[
S = \frac{(v + u)t}{2} \quad \text{.... (i)}
\]

From velocity-time relation \( S = ut + \frac{1}{2} at^2 \), we get

\[
t = \frac{v - u}{a} \quad \text{.... (ii)}
\]

From equations (i) and (ii) we get

\[
S = \frac{(v + u)(v - u)}{2a}
\]

or,

\[2as = v^2 - u^2\]

Ans. 4:

(a) When a body moves along a straight line.
(b) Acceleration \( a = 0.2 \text{ m/s}^2 \), Initial velocity \( u = 0 \) Time \( t = 5 \text{ minutes} = 300 \text{ s} \)

Final velocity \( v = ? \)

\[
ad = \frac{(v - u)}{t}
\]

\[
0.2 \quad = \frac{v}{300} \quad \text{or} \quad v = 60 \text{ m/s}
\]

\[
s = ut + \frac{1}{2} at^2
\]

(Second eqn of motion)
SOLUTIONS

\[ s = 0 + \frac{1}{2} \times 0.2 \times (300)^2 \]
\[ = 9000 \text{ m} = 9 \text{ km} \]


\begin{align*}
\text{Ans. 5:} & \quad \text{(a) Average speed is obtained by dividing total distance travelled by total time taken.} \\
& \quad \text{Average velocity is arithmetic mean of initial and final velocity.} \\
& \quad \text{(b) (i) Velocity of A} = \frac{60}{8} = 7.5 \text{ m/s} \\
& \quad \text{(ii) Velocity of B} = \frac{20}{8} = 2.5 \text{ m/s} \\
& \text{Position is 50 m and time is 4 sec.} 
\end{align*}

\[ \begin{align*}
\text{Ans. 1:} & \quad \text{The motion of a circulating fan is non-uniform because the direction of motion changes at every point.} \\
\text{Ans. 2:} & \quad \text{Total length of path covered by train} \\
& \quad = 500 \text{ m} + 100 \text{ m} \\
& \quad = 600 \text{ m} \\
& \text{Speed of train} = 30 \text{ m/s.} \\
& \text{Time taken by train to cover the bridge} \\
& \quad = \frac{\text{distance}}{\text{speed}} \\
& \quad = \frac{600}{30} = 20 \text{ sec.} \\
\text{Ans. 3:} & \quad \text{Here,} \ u = 5 \text{ m/s,} \ a = 0.2 \text{ m/s}^2, \ t = 10 \text{ s,} \ s = ?, \ v = ? \\
& \text{From,} \\
& \quad v = u + at \\
& \quad v = 5 + 0.2 \times 10 \\
& \quad = 7 \text{ m/s} \\
& \text{From,} \\
& \quad v^2 = u^2 + 2as \\
& \quad 7^2 = 5^2 + 2 \times 0.2 \times S \\
& \quad 49 = 25 + 0.4S \\
& \quad 49 - 25 = 0.4S \\
& \quad 0.4S = 24 \\
& \quad S = 24 / 0.4 \\
& \quad S = 60 \text{ m} 
\end{align*} \]

**TOPIC-2**

**Equations of Motion**

**SUMMATIVE ASSESSMENT WORKSHEET-47**

\begin{align*}
\text{Ans. 1:} & \quad \text{The motion of a circulating fan is non-uniform because the direction of motion changes at every point.} \\
\text{Ans. 2:} & \quad \text{Total length of path covered by train} \\
& \quad = 500 \text{ m} + 100 \text{ m} \\
& \quad = 600 \text{ m} \\
& \text{Speed of train} = 30 \text{ m/s.} \\
& \text{Time taken by train to cover the bridge} \\
& \quad = \frac{\text{distance}}{\text{speed}} \\
& \quad = \frac{600}{30} = 20 \text{ sec.} \\
\text{Ans. 3:} & \quad \text{Here,} \ u = 5 \text{ m/s,} \ a = 0.2 \text{ m/s}^2, \ t = 10 \text{ s,} \ s = ?, \ v = ? \\
& \text{From,} \\
& \quad v = u + at \\
& \quad v = 5 + 0.2 \times 10 \\
& \quad = 7 \text{ m/s} \\
& \text{From,} \\
& \quad v^2 = u^2 + 2as \\
& \quad 7^2 = 5^2 + 2 \times 0.2 \times S \\
& \quad 49 = 25 + 0.4S \\
& \quad 49 - 25 = 0.4S \\
& \quad 0.4S = 24 \\
& \quad S = 24 / 0.4 \\
& \quad S = 60 \text{ m} 
\end{align*}
Ans. 4: (a) Weight of an object is the force with which a body is attracted towards the earth. Its direction is vertically downwards.

(b) Final velocity = 0, Initial velocity = 40 ms
\[ v^2 = u^2 + 2gh \]
\[ v^2 - u^2 = 2gh \]
\[ \frac{v^2 - u^2}{2g} = h \]

\[ h = \frac{(0)^2 - (40)^2}{2 \times 10} \]
\[ = \frac{-1600}{20} = 80 \text{ m.} \]

As the directions are opposite and the stone returns back to origin, displacement is Zero.

As the directions are opposite and the stone returns back to origin, displacement is Zero.

Total distance covered = 80 + 80 = 160 m. (CBSE Marking Scheme, 2014) (½)

Ans. 5: (i) Odometer (to measure distance) and his wrist watch to measure time.

(ii) Sincere, logical thinking, confidence and awareness.

(iii) Arvind measured distance and time because this would help him to maintain appropriate average speed throughout his journey. (1 + 1 + 1)

SUMMATIVE ASSESSMENT WORKSHEET-48

Ans. 1: When the body returns back to initial point, e.g., when an athlete returns back to starting point, his average velocity is zero. (1)

Ans. 2: From the graph,
- Velocity after 2s = \( \frac{10}{2} = 5 \text{ m/s} \)
- Velocity after 4s = \( \frac{20}{4} = 5 \text{ m/s} \)
- Velocity after 6s = \( \frac{30}{6} = 5 \text{ m/s} \)

E.g. Velocity is constant, acceleration = 0

So velocity – time graph will be drawn as: (1½)

Ans. 3: (a) Initial velocity \( (u) = 0 \), acceleration \( (a) = 4 \text{m/s}^2 \)
\[ v = u + at \]
\[ = 0 + 4 \times 10 \]
\[ v = 40 \text{ m/s.} \] (1½)

(b) \[ v^2 = u^2 + 2as \]
Ans. 4 : (a) To get a visual representation of things, to manage the data you have and to obtain those information about values you have not measured.

(b) (i) Managing a company’s data.

(ii) Present information easily and quickly.

Ans. 5 : (i) The speed-time (or velocity-time) graph for a body under uniform acceleration is given in the fig, as :

![Speed-time graph](image)

**Derivation of the third equation of motion** : Equation for position-velocity relation.

Distance travelled,

\[ s = \frac{1}{2} \text{ (sum of the parallel sides) } \times \text{ perpendicular distance between the two parallel sides} \]

or, \[ s = \frac{1}{2} (OA + BC) \times OC \]

Putting the values of OA, BC and OC, we get

\[ s = \frac{1}{2} (u + v) \times t \] ... (1)

As we know, \[ v = u + at \]

or, \[ t = \frac{(v-u)}{a} \]

Putting the value of \( t \) in equation (1), we get

\[ s = \frac{1}{2} \left( u + v \right) \times \left( \frac{(v-u)}{a} \right) \]

or, \[ 2as = (u + v)(v-u) = v^2 - u^2 \]

or, \[ 2as = v^2 - u^2 \]

This is the third equation of motion.

(ii) \( u = 0; \ s = 20 \text{ m} \ a = 10 \text{ m/sec}^2 \ v = ? \)

\[ v^2 = u^2 + 2as \]

\[ v^2 = 0 + 2 \times 10 \times 20 \]

\[ v^2 = 400 \]

\[ v = 20 \text{ m/sec} \]

(CBSE Marking Scheme, 2014) 1½
**Ans. 1 :** Average speed of a moving body can never be zero. \( (1) \)

**Ans. 2 :** Satellites revolve around their planets in almost circular orbits with constant speed. Thus, during their motion, the speed remains constant, while the direction of motion changes continuously. As a result, there is a change in their velocity. Therefore, the motion of satellites around their planets is considered as accelerated motion. \( (2) \)

**Ans. 3 :** \( v = 0; \quad u = 10 \text{ m/s} \quad t = 20 \text{ sec.} \)

As,
\[
a = \frac{v - u}{t}
\]
\[
\Rightarrow a = \frac{(0 - 10)}{20} = -0.5 \text{ m/s}^2
\]
\[
s = ut + \frac{1}{2} at^2
\]
\[
= 10 \times 20 + \frac{1}{2} \times -0.5 \times 20 \times 20 = 100 \text{ m}
\]
(CBSE Marking Scheme, 2012) \( (1\frac{1}{2} + 1\frac{1}{2}) \)

**Ans. 4 :** When a body travels equal distances in equal intervals of time, its motion is called uniform motion. If an object travels in a straight line and its velocity increases or decreases by equal amounts in equal intervals of time, then the acceleration of the object is said to be uniform and motion is said to be uniformly accelerated motion.

**Equations :** \( v = u + at \) and \( v^2 = u^2 + 2as \) \( \text{(CBSE Marking Scheme, 2012)} (2 + 1) \)

**Ans. 5 :**
(i) She is concerned, caring and sensible.
(ii) Boys are united, energetic and have sportive and scientific attitude.
(iii) Their tendency is adventurous which can be problematic sometimes.
(iv) Time taken to cover a given length of path is measured by stopwatch.
(v) Race on roads should be avoided by the boys as that might cause a severe accident. \( (1 + 1 + 1 + 1 + 1) \)

**Ans. 6 :**
(a) (i) A body is in uniform acceleration if it travels in a straight path when its velocity increases or decreases by equal time intervals.

(ii) A body is in non-uniform acceleration if it travels in a straight path when its velocity increases or decreases by unequal amount in equal time intervals.

(b) When train starts from rest,
\( u = 0, \ t = 30 \text{ s}, \ v = 108 \text{ km/h} \)
\[
= 108 \times \frac{5}{18} = 30 \text{ m/s}.
\]
\[
a = \frac{v - u}{t} = 1 \text{ m/s}^2.
\]

Distance
\[
S_1 = ut + \frac{1}{2} at^2
\]
\[
= 0 + \frac{1}{2} \times 1 \times 30 \times 30
\]
\[
= 450 \text{ m}.
\]
At uniform velocity of 30 m/s for 20 min = 1200 s,
Distance $S_2 = 30 \times 1200 = 36000$ m.

On applying brakes,
$t = 20$ s, $u = 30$ m/s, $v = 0$

$$a = \frac{v - u}{t} = \frac{0 - 30}{20} = -1.5 \text{ m/s}^2$$

Distance $S_3 = \frac{v^2 - u^2}{2a} = \frac{0 - (30)^2}{2 \times 1.5} = 300$ m

Total distance $= S_1 + S_2 + S_3$
$= 450 + 36000 + 300$
$= 36750$ m.

(2 + 3)

FORMATIVE ASSESSMENT WORKSHEET-50

Note: Students should do this activity themselves.
TOPIC-1
Force, Motion and Acceleration

SUMMATIVE ASSESSMENT

WORKSHEET-51

Ans. 1: Since velocity is uniform, acceleration will be zero therefore net force is zero. \((F = ma)\)
(CBSE Marking Scheme, 2014) (1)

Ans. 2: Release of air in downward direction is action.
Movement of balloon in upward direction is reaction.
(CBSE Marking Scheme, 2014) (1)

Ans. 3: Because the forces applied by the two teams are equal and opposite.
(CBSE Marking Scheme, 2014) (1)

Ans. 4: Newton’s first law states that a body stays at rest if it is at rest and moves with a constant velocity unit if a net force is applied on it. Newton’s second law states that the net force applied on the body is equal to the rate of change in its momentum.

\[
F = ma \\
\text{or} \\
F = \frac{m(v - u)}{t} \\
\text{or} \\
Ft = mv - mu
\]

That is, when \(F = 0\), \(v = u\) for whatever time, \(t\) is taken. This means that the object will continue moving with uniform velocity, \(u\) throughout the time, \(t\). If \(u\) is zero then \(v\) will also be zero, i.e., object will remain at rest.
(2)

Ans. 5: Tennis ball is lighter (less mass) than a cricket ball. Tennis ball moving with same speed has less momentum (mass \(\times\) velocity) than a cricket ball. It is easier to stop tennis ball having less momentum.
(2)

Ans. 6: The sheet shaped in form of a ball falls before the open sheet. Because the open sheet experiences more air resistance due to its large surface–area and this restricts its fall.
(CBSE Marking Scheme, 2014) (1 + 2)

Ans. 7: Mathematical formulation: If a body of mass \((m)\), moving at velocity \((u)\) accelerates uniformly at \((a)\) time \((t)\), so that its velocity changes to \(v\), then

- initial momentum \(p_1 = mu\)
- final momentum \(p_2 = mv\)
- change in momentum \(= p_2 - p_1 = mv - mu = m(v - u)\)

According to second law of motion, force

\[
F \propto \frac{\text{change in momentum}}{\text{time}} \\
F \propto \frac{p_2 - p_1}{t}
\]
we know that
\[ F \propto \frac{m(v - u)}{t} \]
\[ \therefore a = \frac{v - u}{t} \]

Thus
\[ F \propto ma \]
\[ F = kma \]

Here \( k = 1 \)

S.I. unit of force, Newton is equal to kg - m/s\(^2\).

One Newton force is exerted on an object of mass 1 kg to produce an acceleration of 1 m/s\(^2\) in it.

(CBSE Marking Scheme, 2014) (3)

Ans. 8: (a) Newton’s second Law of motion states that the rate of change of momentum of an object is proportional to the applied unbalanced force in the direction of force. It is expressed mathematically as

\[ F \propto m \times (v - u) \]
\[ \frac{F}{t} = km \times (v - u) = kma \]
\[ = k \times (1 \text{ kg}) \times (1 \text{ ms}^{-2}) \]

Force = kg ms\(^{-2}\)

(b) We well observe that the card moves ahead allowing the coin to fall vertically into the glass. This is due to inertia. The inertia of the coin tries to maintain its state of rest. (3 + 2)

**SUMMATIVE ASSESSMENT**

**WORKSHEET-52**

Ans. 1: Unbalanced forces. (CBSE Marking Scheme, 2012) (1)

Ans. 2: Force of friction. (CBSE Marking Scheme, 2012) (1)

Ans. 3: Water is ejected from a hose with a large amount of force [action]. Hence as per Newton’s III law there will be an equal and opposite force on the hose pipe making it difficult to hold. (CBSE Marking Scheme, 2012) (1)

Ans. 4: A friction force (here it is kinetic or sliding friction) always acts parallel to surface but in direction of the opposing motion. Since the wooden cabinet is moving with uniform speed, a horizontal force of 200 N acts on it. According to Newton’s III law of motion, forces are balanced. Hence, a frictional force of 200 N is exerted on the cabinet. (2)

Ans. 5: A frictional force always acts parallel to the surface and is directed to oppose sliding. Banana skin reduces friction (or frictional force) and thus brings body in unbalanced state and we tend to fall. (2)

Ans. 6: (i) Equal in magnitude.

(ii) Opposite in direction.

(iii) Acts simultaneously on two different bodies. (1 + 1 + 1)

Ans. 7: Difference between balanced and unbalanced force:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Balanced force</th>
<th>Unbalanced force</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The net effect produced by a number of forces on a body is zero.</td>
<td>The net effect produced by a number of forces on a body is non-zero.</td>
</tr>
<tr>
<td>2.</td>
<td>It can only bring a change in the shape of the body.</td>
<td>It causes a change in state of rest or of uniform motion of a body.</td>
</tr>
</tbody>
</table>
Ans. 8: Statement of Newton first law of motion: See Q. 12(a) (S.A.T.Q. 3 marks)

\[
F = ma \\
F = \frac{m \times (v - u)}{t} \\
Ft = m (v - u)
\]

That is, when \( F = 0 \), then \( v = u \). Thus the object will continue to move with uniform velocity.

\[
m = 800 \text{ kg}, \quad F = 200 \text{ N} \\
a = \frac{F}{m} = \frac{200}{800} = \frac{1}{4} = 0.25 \text{ m/s}^2 (2 + 3)
\]

**SUMMATIVE ASSESSMENT WORKSHEET-53**

Ans. 1: When forces acting on a body from all sides are equal, they cancel effect of each other and are known as balanced forces. On the other hand, when forces acting on a body are not equal/do not cancel each other are called unbalanced forces. (CBSE Marking Scheme, 2012) (1)

Ans. 3: Sole of the shoe wears out due to friction between sole of the shoes and earth’s surface. (CBSE Marking Scheme, 2012) (1)

Ans. 3: The velocity with which a gun moves backward after firing a bullet is called the recoil velocity of a gun. (CBSE Marking Scheme, 2012) (1)

Ans. 4: According to Newton’s third law of motion, action force is equal to reaction but acts on two different bodies and in opposite directions. When a horse pushes the ground, the ground reacts and exerts a force on the horse in the forward direction. This force is able to overcome friction force of the cart and it moves. (2)

Ans. 5: As the man jumps out from a moving train, his feet suddenly come to rest on touching the ground while his body’s upper part continues to move forward. For this reason he falls with his head forward. So as to save himself, he should run through some distance in the forward direction. (2)

Ans. 6: (a) According to Newton’s II law of motion
(b) According to Newton’s III law of motion
(c) According to Newton’s I law of motion. (1 + 1 + 1)

Ans. 7: (a) The frictional force acts on cart wheel in opposite direction to motion of the cart.
(b) When water is pushed out of sprinkler with a force, it exerts reaction force on the sprinkler causing it to rotate.
(c) Water drops have inertia of rest. They do not move with the cloth as it is jerked and come out. (1 + 1 + 1)

Ans. 8: (a) According to first law of motion, everybody tends to resist change of state whether in rest or in motion. Qualitatively this tendency of the body to stay at rest or keep moving with same velocity is called inertia.
(b) Cricket ball (because its mass is larger, so inertia of motion is larger)
(c) \[
\begin{align*}
    u &= 72 \text{ km/h} = 20 \text{ m/s} \\
    v &= u + at \\
    a &= -20/3 \\
    &= -6.6 \text{ m/s}^2
\end{align*}
\]

Now;
\[
F = ma \\
= 1200 \times -6.6 \\
= -7920 \text{ N} (2 + 1 + 2)
\]
SUMMATIVE ASSESSMENT  WORKSHEET-54

Ans. 1 : Acceleration becomes half. (CBSE Marking Scheme, 2012) (1)

Ans. 2 : Changing in speed/change of direction/change of shape. (any two) (CBSE Marking Scheme, 2012) (1)

Ans. 3 : Change its shape and size. (CBSE Marking Scheme, 2012) (1)

Ans. 4 : Given, mass of hammer

Initial velocity of hammer

\( m = 500 \text{ g} = 0.5 \text{ kg} \)

Final velocity of hammer

\( u = 50 \text{ m/s} \)

Duration

\( t = 0.01 \text{ s} \)

Using second law of motion,

\[ F = ma = m \frac{(v - u)}{t} \]

\[ F = 0.5 \times \frac{(0 - 50)}{0.01} = \frac{(0.5 \times -50)}{0.01} = -2500 \text{ N} \]

The –ve sign shows the force of 2500 N acts in the opposite direction of motion. (2)

Ans. 5 : The child who throws the mass towards the other, and the one who catches it, both move backwards. (Reason) — Thrower moves due to backward reaction of mass pushed forward. Catcher moves due to forward reaction of mass pushed and held backward. (2)

Ans. 6 : Here \( m = 1 \text{ kg}, s = 12 \text{ m}; \)

\[ u = 0; \quad F = 6 \text{ N}; \quad t = ? \]

From

\[ F = m \times a \]

\[ a = \frac{F}{m} = \frac{6}{1} = 6 \text{ m/s}^2 \]

Now;

\[ s = ut + \frac{1}{2}at^2 \]

\[ 12 = 0 + \frac{1}{2} \times 6 \times t^2 \]

\[ 3t^2 = 12 \]

\[ t^2 = 4; \]

\[ t = 2 \text{ sec.} \] (CBSE Marking Scheme, 2012) (1)

Ans. 7 : (i) Shivansh showed experimental, observatory and skillful behaviour.

(ii) Displacement = Area under the \( v-t \) curve.

(iii) His wife showed smart, knowledgeable, logical and practical behaviour. (1 + 1 + 1)

Ans. 8 : (i) Balanced forces :

(1) A box doesn’t move when a small force is applied.

(2) Force is balanced.

Unbalanced forces :

(3) The box starts moving, when the applied force is increased.

(4) Force is unbalanced.

(ii) (a) Unbalanced : because the box is coming down with increasing velocity.

(b) Balanced : because velocity is constant.

(c) Balanced : since rope does not go the either side , both are applying equal and opposite forces.

(d) Unbalanced : Since velocity of ball is decreasing. (2 + 3) 

SOLUTIONS P-51
Ans. 1: Since masses are in ratio 3 : 5.

Let the mass of the objects be 3x and 5x.

Let \( F_1 \) and \( F_2 \) be the two forces with \( a_1 \) and \( a_2 \) accelerations.

\[
F_1 = m_1a_1 = 3xa_1
\]

and

\[
F_2 = m_2a_2 = 5xa_2
\]

Since \( F_1 : F_2 = 5 : 3 \), we have

\[
3xa_1 : 5xa_2 = 5 : 3
\]

\[
\Rightarrow a_1 : a_2 = 5 \times 5 : 3 \times 3
\]

\[
\Rightarrow a_1 : a_2 = 25 : 9 \quad (2)
\]

Ans. 2: Given, mass of the box \( (m) = 50 \) kg

Force \( (F) \) acting on box = 80 N

Acceleration \( (a) = ? \)

Since 

\[
\text{Force (F)} = \text{mass (m)} \times \text{acceleration (a)}
\]

\[
\Rightarrow a = \frac{F}{m} = \frac{80}{50} = 1.6 \text{ m/s}^2
\]

If mass is doubled

\[
m_1 = 2 \times 50 = 100 \text{ kg}
\]

Acceleration

\[
(a) = \frac{80}{100} = 0.8 \text{ m/s}^2 \quad (2)
\]

Thus, the acceleration will be halved if the mass is doubled.

Ans. 3:

\[
F = ma
\]

\[
m_1 = \frac{5}{8} \text{ kg} \quad m_2 = \frac{5}{24} \text{ kg}
\]

If the masses are tied, total mass

\[
M = m_1 + m_2
\]

\[
= \frac{5}{8} + \frac{5}{24} = \frac{5}{6} \text{ kg}
\]

\[
\therefore \quad \text{Acceleration produced} = \frac{5}{5/6} = 6 \text{ m/s}^2 \quad (3)
\]

Ans. 4: Given, mass of the car \( (m) = 1000 \) kg

(i) As shown in graph,

Distance covered in first 2 secs

\[
= \text{Area of } \triangle \text{ inscribed in first 2 s.}
\]

\[
= \frac{1}{2} \times \text{base} \times \text{height}
\]

\[
= \frac{1}{2} \times 2 \times 15 = 15 \text{ m} \quad (1)
\]

(ii) Force \( (F) = \text{mass (m)} \times \text{acceleration (a)} \)

Time taken by force to stop the car = 6 – 5 = 1 second

Initial velocity \( (i.e., \) velocity at \( B) = 15 \text{ m/s} \)

Final velocity (at point \( C) = 0 \text{ m/s} \)
Using equation \( v = u + at \)

\[
a = \frac{(v - u)}{t} = \frac{(0 - 20)}{0.02} = -15 \text{ m/s}^2
\]

(– ve sign indicates that it is retardation)

Force applied by brakes = 1000 \times -15 = -15000 \text{ N} = -15 \text{ KN}

Ans. 5 : 
(a) To every action, there is always an equal and opposite reaction.
(b) The boat moves in the backward direction when the person jumps from it in the forward direction and in turn boat also exerts an equal force on the man in forward direction.
(c) Walls of stretched balloon exert a force on air to push it out, air applies a force in opposite direction.

(CBSE Marking Scheme, 2014) 1 + 1 + 1

Ans. 6 : 
(i) Net force acting on the object = \( F_2 - F_1 \)

\[
= 30 \text{ N} - 20 \text{ N} = 10 \text{ N}
\]

(ii) Net force acts in the direction of force \( F_2 \).

(iii) Since the object is not moving, all forces are balanced.

The Force is the force of friction. It acts between object (lower surface) and floor (upper surface).

Its direction is that of \( F_1 \).

(CBSE Marking Scheme, 2012) 1 + 1 + 1

TOPIC-2
Inertia and Conservation of Momentum

SUMMATIVE ASSESSMENT WORKSHEET-56

Ans. 1 : Inertia of a body depends on its mass. A cricket ball has more mass than a rubber ball, thus it has greater inertia.

(1)

Ans. 2 : As dust possess inertia of rest, it resists the change and falls down.

(1)

Ans. 3 : When the driver of the bus in which a person is travelling applies brakes suddenly, the person tends to move forward due to inertia.

(1)

Ans. 4 : Inertia is a tendency of the object to resist change in its state. Newton’s first law of motion also states similar i.e., the object will remain in its present state unless an external force is applied. That’s why Newton’s first law is called Law of inertia.

(2)

Ans. 5 : Activity :

(i) Take a test tube of good quality glass material and put a small amount of water in it. Place a stop cork at the mouth of it.

(ii) Now suspend the test tube horizontally by two strings or wires as shown in fig.

(iii) Heat the test tube with a burner until water vaporises and the cord blows out.

(iv) Observe that the test tube recoils in the direction opposite to the direction of the cork.
(v) Also observe the difference in the velocity the cork appears to have and that of the recoiling test tube.

Hence, the total momentum of the two objects is unchanged or conserved by the collision. (3)

**Ans. 6:** Collision between trucks, because more is the mass, more is the inertia and therefore more is the momentum. Mass of the trucks is more than that of cars so collision of trucks will cause more damage. (3)

**Ans. 7:**

\[
\begin{align*}
  v^2 &= u^2 + 2gh \\
  0^2 &= u^2 + 2 \times 10 \times 20 \\
  0^2 &= u^2 + 400 \\
  u^2 &= 400 \\
  u &= \sqrt{400} = 20
\end{align*}
\]

Momentum = mass \times velocity

\[
\begin{align*}
  &= 4 \times 20 \\
  &= 80 \text{ kg m/s}
\end{align*}
\]

**Ans. 8:** Inability of the body to change by itself its state of rest or state of uniform motion is called inertia. Types:

**Inertia of rest:** e.g.:

(i) When a card is flicked with a finger the coin placed over it falls in the tumbler.
(ii) Only the carom coin at the bottom of a pile is removed when a fast moving carom striker hits it.

**Inertia of motion:** e.g.:

(i) When a moving bus stops suddenly, the luggage might slide towards the front side of the bus and fall.
(ii) We tend to fall forward when a bus suddenly stops. (CBSE Marking Scheme, 2012) (1 + 2 + 2)

**SUMMATIVE ASSESSMENT WORKSHEET-57**

**Ans. 1:** Solid made of steel has the highest inertia because its mass is greater than aluminium and wooden solids. (CBSE Marking Scheme, 2012) (1)

**Ans. 2:** Steel block as it has highest mass. (CBSE Marking Scheme, 2012) (1)

**Ans. 3:** 150 kgm/s. (CBSE Marking Scheme, 2012) (1)

**Ans. 4:**

\[
\begin{align*}
  \text{Momentum (P)} &= \text{mass (m)} \times \text{velocity (v)} \\
  \text{Mass of bullet} &= 10 \text{ g} = 10 \times 10^{-3} \text{ kg} \\
  &= 10^{-2} \text{ kg} \\
  \text{Velocity of bullet} &= 400 \text{ m/s} \\
  \text{Momentum of bullet} &= 10^{-2} \text{ kg} \times 400 \text{ m/s} = 4 \text{ kg m/s} \\
  \text{Mass of cricket ball} &= 400 \text{ g} = 400 \times 10^{-3} \text{ kg} \\
  &= 0.400 \text{ kg}
\end{align*}
\]
Velocity of ball = 90 km/hr
\[
\frac{90 \times 1000}{3600} = 25 \text{ m/s}
\]

Momentum of ball = 0.400 \times 25 = 10 \text{ kg m/s} \hspace{1cm} (2)

\[\therefore\] The cricket ball has higher momentum.

**Ans. 5:**
(a) No. It is not the violation of law of inertia.

Law of inertia is obeyed only when no external force acts on a body. But in this case the friction due to the ground acts on the ball, so it comes to rest.

(b) Player lowers his hand because by doing so he increases the time in which velocity of ball comes to zero. This decreases the rate of change of momentum and so the impact of force is reduced.

(CBSE Marking Scheme, 2012) (1 + 1 + 1)

**Ans. 6:**
(a) Five rupee coin, because it has more mass.

(b) \[
\frac{P_1}{P_2} = \frac{4m \times 4v}{mv} = 16
\]

(CBSE Marking Scheme, 2012) (1½ + 1½)

**Ans. 7:**
(a) (i) Stone. \hspace{1cm} (½)

(ii) Box filled with clothes. \hspace{1cm} (½)

(b) (i) This is done to prevent luggage from falling when the vehicle is suddenly stopped or started because due to inertia the luggage will experience a jerk in a direction opposite to the direction of vehicle.

(ii) On shaking, branch comes to state of motion and leaves which are in state of rest experience a jerk due to which these get detached and fall down.

(CBSE Marking Scheme, 2012) (1)

**Ans. 8:**
(a) Momentum is the product of mass and velocity.

SI unit of momentum is -kgm/s.

(b) \[
\begin{align*}
v^2 &= u^2 + 2gh \\
v^2 &= (0)^2 + 2(10) (5) \\
v^2 &= 100 \\
v &= 10 \text{ m/s}
\end{align*}
\]

momentum = \[m \times v\]
\[= 10 \times 10 = 100 \text{ kg m/s}\]

(c) The karate player strikes the pile of tiles with his hand very fast. In doing so, the large momentum of fast moving hand is reduced to zero in a very short time. This exerts a very large force on the pile of tiles which is sufficient to break them.

(CBSE Marking Scheme, 2012) (1 + 1 + 2 + 1)

**SUMMATIVE ASSESSMENT**

**WORKSHEET-58**

**Ans. 1:** Mass. SI unit is kg. \hspace{1cm} (CBSE Marking Scheme, 2012) (½ + ½)

**Ans. 2:** During the ride, pillion rider and driver are in a state of motion. But when the driver applies brakes, the body of pillion rider continues moving forward on account of inertia of motion. Therefore, the pillion rider falls forward. \hspace{1cm} (2)

**Ans. 3:** Inertia: Inability of the body to change by itself its state of rest or state of uniform motion.

Activity:
(i) Apply some force on a football.
(ii) It flies away as it has small inertia.
(iii) Apply same force on same size of stone.
(iv) Stone hardly moves as it has more inertia. \hspace{1cm} (CBSE Marking Scheme, 2012) (1 + 2)
Ans. 4: **Law of Inertia**: An object remains in its state of rest or of uniform motion in a straight line until an external unbalanced force acts on it.

When a moving bus stops suddenly, the bus slows down but our body tends to remain in state of motion due to inertia of motion. Sudden start of bus brings motion to the bus as well as our feet but rest of the body still has inertia of rest due to which we fall backwards.

(CBSE Marking Scheme, 2012) (1 + 2)

Ans. 5: It is because of inertia of motion. When the horse was in motion, the whole body of the rider was in motion. But when the horse stops suddenly the lower portion of the rider which is in contact with the horse comes to rest but the upper portion of him wants to remain in motion.

(CBSE Marking Scheme, 2012) (1 × 3)

Ans. 6: (a) When two or more bodies act upon one another their total momentum remains constant, provided no external forces are acting.

(b) (i) Air from inside the balloon escapes from the mouth of the balloon.

Balloon moves in opposite direction that is from left to right.

(ii) Forces of action and reaction are equal and opposite.

(CBSE Marking Scheme, 2012) (2 + 1 + 1 + 1)

Ans. 1: **Force**. (CBSE Marking Scheme, 2012) (1)

Ans. 2: Zero as \( v = 0 \). (CBSE Marking Scheme, 2012) (1)

Ans. 3: (a) Due to inertia of direction, wheels rotate at high speed and mud sticking to the wheel flies off tangentially.

(b) This increases the time of catching, decreases the acceleration of the ball, hence force exerted on the hands decreases.

(c) High velocity of pebbles, decreases to zero in a very short interval of time for which it remains in contact with glass pane and shatters the glass pane. (CBSE Marking Scheme, 2012) (1 + 1 + 1)

Ans. 4: Momentum possessed by a body is defined as the product of mass and velocity of the body.

If a body of mass \( m \) moves with a velocity \( v \), then momentum \( p \) is given by,

\[
p = mv
\]

**Law of conservation of Momentum**: When no external force acts on a body, its momentum will remain constant.

We know, that

\[
F = F_1 + F_2 + \ldots + F_N
\]

\[
\text{Force} = \frac{\text{Total change in momentum}}{\text{Time taken}} = \frac{\text{Sum of momentum change in each mass}}{\text{Time}}
\]

When \( F = 0 \), then \( p = \text{constant} \) or \( p_1 + p_2 + \ldots + p_N = \text{constant} \). Sum of the momentum = constant \( (1 + 2) \)

Ans. 5: Since both car and insect are moving with uniform speed, and there is no external force applied. Hence, total momentum is conserved, i.e.

\[
(m_c u_c) + (m_i u_i) = (m_c - m_i) v
\]

\[
\Rightarrow (1500 \times 25) + (0.01 \times -5) = (1500 + 0.01) \times v
\]

\[
\Rightarrow 37500 - 0.05 = 1500.01 \times v
\]

(values are assumed)
⇒ \[37499.95 = 1500.01 \times v\]
⇒ \[v = \frac{37499.95}{1500.01} = 24.9998 \text{ m/s}\]

So velocity of insect changes from – 5 m/s to 24.9998 m/s (big change)

Velocity of car changes from 25 m/s to 24.9998 m/s (almost a negligible change)

Change in momentum of the car

\[= (m_1v_1) - (m_1u_1) = m_1(v - u_c)\]
\[= 1500 \times (24.9998 - 25)\]
\[= -0.3 \text{ N-s}\]

Change in momentum of the insect

\[= (m_2v_2) - (m_2u_2) = m_2(v - u_i)\]
\[= 0.01 \times (24.9998 + 5) = 0.3 \text{ N-s}\]

⇒ The momentum gained by the insect is equal to the momentum lost by the car.

(a) Kiran is incorrect in terms of change in momentum. However, she is correct, the change in velocity of insect is higher than that of the car.

(b) Akhtar observation is correct that speed of car is higher than that of insect. However, he is incorrect that the insect experiences larger force. According to Newton’s third law of motion both experienced the same amount of force.

(c) Rahul is correct that both experienced the same force. If he says the amount of change in momentum in both objects is the same, then he is correct.

\[= (2 + 1 + 1 + 1)\]

**Ans. 6:**

(a) \[m_1 = 100 \quad g = 0.1 \text{ kg} \quad m_2 = 200 \quad g = 0.2 \text{ kg}\]

\[u_1 = 2 \text{ m/s} \quad u_2 = 1 \text{ m/s} \quad v_1 = 1.67 \text{ m/s}\]

\[v_2 = ?\]

According to the law of conservation of momentum

\[m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2\]
\[0.1 \times 2 + 0.2 \times 1 = 0.1 \times 1.67 + 0.2 \times v_2\]
\[0.2 + 0.2 = 0.167 + 0.2 \times v_2\]
\[v_2 = 1.165 \text{ m/s}\]

(b) It is based on Newton’s third law of motion. As boat is floating and is not fixed, so it moves backwards.

(CBSE Marking Scheme, 2012) \[3 + 2\]

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**PRACTICAL BASED QUESTIONS**

**WORKSHEET-60**

**Ans. 1:** (c) (Range 0–250 g wt.; Least count 2.0 g wt) (1)

**Ans. 2:** (c) the difference between highest and lowest value of weight that can be measured with a spring balance. (1)

**Ans. 3:** (d) 450 gwt (225 × 2) (1)

**Ans. 4:** (a) (balanced forces do not make the body to move) (1)

**Ans. 5:** (c) Momentum \[p = mv\]

\[= \text{kg m/s}^{-1}\] (1)

**Ans. 6:** (d) The least count of spring balance is 0.5 gwt. (1)

**Ans. 7:** (d) Force that opposes the motion is called frictional force. (1)

**Ans. 8:** (c) \[F_1 = F_2\] (1)

**Ans. 9:** (a) \[F \propto m\] (1)

**Ans. 10:** (d) Range 0 – 100 gwt and least count of 1 gwt. (1)

**SOLUTIONS**
Ans. 11: The third law of motion states that when one object exerts a force on another object, the second object also exerts a force back on the first. (2)

Ans. 12: When a person steps out of a boat, he pushes the boat backwards. But the reaction force of the boat pushes the man forward. (2)

FORMATIVE ASSESSMENT WORKSHEET-61

Note: Students should do this activity themselves.
SUMMATIVE ASSESSMENT WORKSHEET-62

Ans. 1 : SI unit of weight is newton (N). (1)

Ans. 2 : At poles the radius of the earth is lesser than that at the equator. (CBSE Marking Scheme, 2015) 1

Ans. 3 : Galileo Galilei. (1)

Ans. 4 : Gravitational force. (1)

Ans. 5 : 
\[ h = 180 \text{ m}, t = ?, g = 10 \text{ m/s}^2, u = 0 \]
\[ h = ut + \frac{1}{2}gt^2 \]

or
\[ h = \frac{1}{2}gt^2 \]

or
\[ 180 = \frac{1}{2} \times 10 \times t^2 \]

or
\[ t^2 = \frac{180 \times 2}{10} = 36 \]

\[ t = 6 \text{ sec} \] (2)

Ans. 6 : Drop two balls with different mass from a tall building at the same time. They will reach the ground at the same time. Both the balls are at free fall and their initial velocity is same, that is zero. You know that \( s = \frac{1}{2}gt^2 \).

So the only way that they touch the ground at the same time is that acceleration is same for both the balls. This experiment proves that during free fall every object accelerate at the same rate, irrespective of its mass. (CBSE Marking Scheme, 2014) (2)

Ans. 7 : On earth value of \( g \) is maximum at poles and minimum at the equator. At poles radius of earth is less so value of \( g \) is more, at equator radius of earth is more so value of \( g \) is less. \( g = \frac{1}{R} \). (CBSE Marking Scheme, 2014) (1 + 1)

Ans. 8 : Given that, the weight of the soil on earth is 60 N. \( g_{\text{earth}} = 10 \text{ ms}^{-2} \)

Mass on the earth \( m_1 = \frac{60}{10} = 6 \text{ kg} \)

Weight of the soil on moon = 10 N

\[ g_{\text{moon}} = \frac{g_{\text{earth}}}{6} = \frac{10}{6} \text{ ms}^{-2} \]

Mass on moon \( m_2 = \frac{10 \times 6}{10} = 6 \text{ kg} \)

Because \( m_1 = m_2 \), hence there has been no loss in mass of the soil on the surface of moon and decrease in weight was due to difference in the gravity. (CBSE Marking Scheme, 2014) (2)

Ans. 9 : No, his weight will not remain same as that at the poles. There will be a decrease in his weight at the equator. As the radius of the earth increases from the poles to the equator, the value of ‘\( g \)’ becomes greater at poles decreasing towards equator. Also, the force of gravity decreases from poles to the equator. (3)

Ans. 10 : 
\[ \text{Let } F = \frac{Gm_1m_2}{r^2} \text{ and } F' = \frac{Gm_1m_2}{(r')^2} \]
We know \( F = 100 \text{ N} \) \( F' = 50 \text{ N} \)

\[
\frac{F}{F'} = \left( \frac{r'}{r} \right)^2
\]

or,

\[
\frac{100}{50} = \left( \frac{r'}{r} \right)^2 \text{ or } r' = \sqrt{2} \times r.
\]

The distance should be \( \sqrt{2} \times r \) times. \( \text{(3)} \)

**Ans. 11**

(a) **Frictional force**: Backwards

Example: If a book slides across the surface of a desk, then the desk exerts a frictional force in opposite (i.e. backwards) direction of its motion.

(b) **Gravitational force**: Downwards

Example: When we throw a ball in the air, it returns to the ground. \( \text{(1½ + 1½)} \)

**Ans. 12**

Differences between mass and weight: See Q. 6(b) S.A.T. II.

Mass of the astronaut on moon = 70 kg, \( g = 1.6 \text{ m/s}^2 \) on moon

\[ W = m \times g \]

\[ = 70 \times 1.6 = 112 \text{ N} \]

is the weight of astronaut on moon.

The mass of a body is constant everywhere in the universe. So, the mass of the astronaut would be same on the earth as well as on the moon i.e. 70 Kg. \( \text{(3 + 2)} \)

**SUMMATIVE ASSESSMENT WORKSHEET-63**

**Ans. 1**: Sir Issac Newton. \( \text{(1)} \)

**Ans. 2**: Henry Cavendish. \( \text{(1)} \)

**Ans. 3**: The unit of gravitational constant is \( \text{Nm}^2 \text{ kg}^{-2} \). \( \text{(1)} \)

**Ans. 4**: (a) Gravitational force between the moon and the earth keeps moon in uniform circular motion around the earth.

(b) They do not exert any force/weight on their spaceship due to the absence of gravity in space. \( \text{(CBSE Marking Scheme, 2014) (1 + 1)} \)

**Ans. 5**: (i) The force that binds us to earth.

(ii) The motion of moon around earth.

(iii) The motion of planets around sun.

(iv) Formation of tides. \( \text{ (½ × 4)} \)

**Ans. 6**: \[ F = \frac{Gm_1 m_2}{d^2} \]

(i) If \( m_1 = 2m_2 \), then \( F \) becomes twice.

(ii) If \( d = 3d_1 \), then \( F \) becomes one-ninth. \( \text{(CBSE Marking Scheme, 2014) (1 + 1)} \)

**Ans. 7**: (i) Universal gravitational constant is the constant ‘\( G \)’ appearing in Newton’s law of gravitation.

\[ F = \frac{G m_1 m_2}{r^2} \]

where \( F \) is the force between two masses \( m \) and \( M \) at a distance \( r \) apart. The numerical value of \( G \) is equal to \( 6.67 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2} \). The value of \( G \) was found out by Henry Cavendish (1731-1810) by using a sensitive balance.

(ii) **Free fall**: Whenever objects fall towards the earth under the gravitational force alone, we can say that the objects are in free fall. While falling there is no change in the direction of motion of the objects. But due to earth’s attraction, there will be a change in the magnitude of the velocity. \( \text{(1½ + 1½)} \)
Ans. 8: (a) Weight of a body is the force of attraction of the earth on that body. This force depends on the mass \((m)\) of the body and the acceleration due to gravity \((g)\).

\[
F = m \times a \\
F = m \times g \\
W = m \times g
\]

The weight \((W)\) of the body is directly proportional to the mass of the body.

(b) Difference between mass and weight:

<table>
<thead>
<tr>
<th>Mass</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Its value remains constant at all places.</td>
<td>1. Its value changes from place to place due to change in the ('g').</td>
</tr>
<tr>
<td>2. It is a scalar quantity.</td>
<td>2. It is a vector quantity.</td>
</tr>
<tr>
<td>3. It is never zero.</td>
<td>3. It is zero at the centre of earth.</td>
</tr>
<tr>
<td>4. Its unit is kg.</td>
<td>4. Its unit is N or kg wt.</td>
</tr>
</tbody>
</table>

\[(1 + 2)\]

Ans. 9: (a) 

(i) \(g_{earth} \times \frac{1}{6} = 9.8 = 1.63 \text{ ms}^2\)

(ii) Mass on moon = \(\frac{F}{g} \times \frac{110.84}{1.63} = 68 \text{ kg}\)

(iii) Weight on earth = \(mg = 68 \times 9.8 = 666.04 \text{ N}\).

(b) Derivation of \(g = \frac{GM}{R^2}\)  

(CBSE Marking Scheme, 2015) (5)

Detailed Answer:

(a) (i) \(g_{earth} \times \frac{1}{6} = 9.8 = 1.63 \text{ ms}^2\)

(ii) Mass on moon will be constant and does not change from place to place. Hence, mass of the person on moon will be 68 kg.

(iii) Weight on earth = \(110.84 \times 6 = 666.04 \text{ N}\).

(b) According to Newton’s law of gravitation, the force of attraction between earth and a body is given by

\[F = \frac{GmM}{r^2}\]  

... (i)

Force produces an acceleration ‘\(g\)’. So, from Newton’s second law \(F = mg\)  

... (ii)

From equation (i) and (ii) we get

\[mg = \frac{GmM}{r^2}\]

\[g = \frac{GM}{r^2}\]

SUMMATIVE ASSESSMENT WORKSHEET-64

Ans. 1: No. 1 (1)

Ans. 2: A small value of \(G\) indicates that the force of gravitational attraction between two ordinary sized objects is a very weak force. (1)

Ans. 3: No. (1)

Ans. 4: (i) Latitude of the place. (ii) Mass of the earth.

Value is maximum at poles and minimum at equator of the earth. (CBSE Marking Scheme, 2012) (1 + 1)
**Ans. 5:** In air the coin will touch the ground first. In vacuum both will touch the ground together.

**Reason:** In case of air the resistance provided by the air is more for paper than coin.

(CBSE Marking Scheme, 2012) (1 + 1)

**Ans. 6:**

(a) Backward
(b) Downward
(c) Towards the centre

(CBSE Marking Scheme, 2014) (1 + 1 + 1)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Acceleration due to gravity, ( g )</th>
<th>Universal gravitational constant ( G )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Acceleration due to gravity is the acceleration acquired by a body due to the earth’s gravitational pull on it.</td>
<td>Gravitational constant is numerically equal to the force of attraction between two masses of 1 kg that are separated by a distance of 1 m.</td>
</tr>
<tr>
<td>2.</td>
<td>( g ) is a vector quantity.</td>
<td>( G ) is a scalar quantity.</td>
</tr>
<tr>
<td>3.</td>
<td>It is different at different places on the surface of the earth. Its value also varies from one celestial body to another.</td>
<td>The ‘( G )’ is a universal constant i.e., its value is the same (i.e. ( 6.7 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2} )) everywhere in the universe.</td>
</tr>
</tbody>
</table>

**Ans. 8:**

(i) \( g \propto \frac{1}{R^2} \), at equators \( g \) is minimum and at poles \( g \) is maximum.

(ii) Radhika was illogical, enthusiastic and doubtful towards things. (Sceptical)

(iii) Relation between ‘\( g \)’ and ‘\( G \)’ is

\[
g = \frac{Gm}{R^2}
\]

\( (1 + 1 + 1) \)

**Ans. 9:**

(a) Let mass of first body be \( m_1 \)

Let mass of second body be \( m_2 \)

Force on 1\(^{st}\) body = Force on 2\(^{nd}\) body

\[
\frac{GMm_1}{R^2} = \frac{GMm_2}{R^2}
\]

\( G \) and \( G \) cancel. \( M \) and \( M \) cancel \( R^2 \) and \( R^2 \) cancel

This leaves

\[
m_1 = m_2
\]

Hence proved.

(b) \( g = \frac{GM}{R^2} \)

(c) Its value is constant in universe.

(Board marking scheme, 2014) (3 + 1 + 1)

---

**SUMMATIVE ASSESSMENT WORKSHEET-65**

**Ans. 1:** Galileo climbed to the top of the Leaning Tower of Pisa in the presence of a large gathering, and dropped spheres of different masses and materials from the top simultaneously. All the spheres reached the earth’s surface at the same time. So, he concluded that the acceleration of an object falling freely towards the earth does not depend on the mass of the object.

1

**Ans. 2:** Because its value remains constant at all the places in the universe.

1

**Ans. 3:** \( F = G \frac{Mm}{d^2} \) and we know that \( F \propto m_1 \times m_2 \) and \( F \propto \frac{1}{d^2} \). Now, if distance is increased four times, one of mass has to be increased 16 times, it will keep \( F \) same.

(CBSE Marking Scheme, 2012) 1 + 1
Ans. 4: Force on planet = 6 × force on earth
So, \( g \) on planet = 6 \( g \) on earth = 6 × 9.8
= 58.8 m/s\(^2\)

Weight on planet = \( mg \) = 50 \times 58.8 = 2940 N (CBSE Marking Scheme, 2012) \( 1 + 1 \)

Ans. 5: When the lift is falling freely under the gravity, then the body of weight 600 N kept in it also falls freely under the action of gravity. In this case the reaction (force) of the floor of the lift on the body is zero, so the action (force) of the body on the floor of the lift should also be zero (By Newton’s III Law of Motion). Hence, no force is exerted by the body on the floor of the lift when the lift is falling freely under the gravity. The body is weightless under such situations.

Ans. 6: The acceleration produced in the motion of a body falling freely under the force of gravity is called acceleration due to gravity. It is denoted by ‘\( g \)’.

Consider the earth to be a sphere of mass \( M \) and radius \( R \), as shown in the figure. Suppose a body of mass \( m \) situated at distance \( r \) from the centre of the earth.

As we know, according to Newton’s law of gravitation, the force of attraction between the earth and the body is given by
\[
F = \frac{GMm}{r^2}
\]  
...(1)

This force produces an acceleration ‘\( g \)’, called acceleration due to gravity in the body of mass \( m \).

So, from Newton’s second law,
\[
F = mg
\]  
...(2)

From equations (1) and (2), we get
\[
mg = \frac{GMm}{r^2}
\]

or
\[
g = \frac{GM}{r^2}
\]  
...(3)

This equation gives acceleration due to gravity at points far away from the earth. Now, if body is located on the surface of the earth, then \( r = R \), i.e., the radius of the earth. Then equation (3) becomes
\[
g_{\text{surface}} = \frac{GM}{R^2}
\]
This equation gives acceleration due to gravity at the surface of the earth.

The value of ‘\( g \)’ on the earth’s surface is 9.8 m/s\(^2\). (CBSE Marking Scheme, 2012) \( 1 + 2 \)

Ans. 7: Since, height of the tower,
\( h = 245 \) m
Initial velocity of the particle,
\( u = 0 \) m/s

(i) Time taken by the stone to reach the ground, \( t = ? \)
Using the equation,
\[
h = ut + \frac{1}{2} gt^2
\]
we get
\[
245 = 0 \times t + \frac{1}{2} \times 10 \times t^2
\]
\[
\Rightarrow t = 7 \text{ sec}
\]
Thus, the measured time was incorrect.

(ii) Final velocity, when the stone touched the ground,
Using the equation, \( v = u + gt \)
\[
\Rightarrow v = 0 + 10 \text{ m/s}^2 \times 7 = 70 \text{ m/s}
\]

(iii) By using the above given equations of motion, we draw the following table.

<table>
<thead>
<tr>
<th>Time (t)</th>
<th>Distance (s)</th>
<th>Velocity (v)</th>
<th>Acceleration a (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 s</td>
<td>0 m</td>
<td>0 m/s</td>
<td>10 m/s(^2)</td>
</tr>
<tr>
<td>1 s</td>
<td>5 m</td>
<td>10 m/s</td>
<td></td>
</tr>
</tbody>
</table>
(iv) The distance-time graph, velocity-time graph and acceleration-time graph for the above table are given below:

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>Distance (m)</th>
<th>Velocity (m/s)</th>
<th>Acceleration (m/s²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>10 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>20 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>30 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>4</td>
<td>80</td>
<td>40 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>5</td>
<td>125</td>
<td>50 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>6</td>
<td>180</td>
<td>60 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>7</td>
<td>245</td>
<td>70 m/s</td>
<td>10 m/s²</td>
</tr>
</tbody>
</table>

**SUMMATIVE ASSESSMENT WORKSHEET-66**

**Ans. 1:** The unit of mass is kilogram (kg).  
(1)

**Ans. 2:** Weight of a body is the force with which a body is attracted towards the centre of the earth.  
(1)

**Ans. 3:** Newton.  
(1)

**Ans. 4:** (i) Masses of object, (ii) Distance between them as  
\[ F \propto m_1 \times m_2 \quad \text{and} \quad F \propto \frac{1}{d^2} \]  
(CBSE Marking Scheme, 2012) (1 + 1)

**Ans. 5:** Acceleration of free fall is called as acceleration due to gravity \( g = 9.8 \, \text{m/s}^2 \)  
Gravitational force between the earth and an object is called weight.  
(CBSE Marking Scheme, 2012) (1 + 1)
Ans. 6: It becomes four times when distance between them is reduced to half as $F \propto \frac{1}{d^2}$.

(CBSE Marking Scheme, 2012) (1 + 1)

Ans. 7: (a) No, because weight is the force with which the earth attracts the object, $W = m \times g$

Value of $g$ is greater at poles, weight of the same amount gold will be less on equator.

(b) The moon attracts the earth, but the earth does not move towards the moon because mass of moon is very less as compared to mass of the earth. (CBSE Marking Scheme, 2012) (1 + 1 + 1)

Ans. 8: (a) He tells Sonu that the arrow follows a curved path (projectile motion) and hits a little below the aim.

(b) Sonu is recipient, logical and questioning child.

(c) Manu is patient, scientific, logical and convincing. (1 + 1 + 1)

Ans. 9: (i) For the first ball,

Initial velocity, $u = 0 \text{ m/s}$; distance covered, $s = 30 \text{ m}$; acceleration, $a = g = 10 \text{ m/s}^2$

Now, using the second equation of motion,

$$s = ut + \frac{1}{2}at^2$$

$$\Rightarrow s = ut + \frac{1}{2}gt^2$$

Substituting the values in the above equation, we get

$$45 = 0 \times t + \frac{1}{2} \times 10 \text{ m/s}^2 \times t^2$$

$$45 = 5 \text{ m/s}^2 \times t^2$$

$$t^2 = 9 \Rightarrow t = 3 \text{ s}$$

Thus, the first ball takes 3 s to reach the water surface. For the second ball, initial velocity, $u = ?$; distance covered, $s = 45 \text{ m}$; time taken, $t = 3 \text{ s} - 1 \text{ s} = 2 \text{ s}$

Now, again using the second equation of motion,

$$s = ut + \frac{1}{2}at^2$$

$$\Rightarrow s = ut + \frac{1}{2}gt^2$$

So,

$$45 \text{ m} = u \times 2s + \frac{1}{2} \times 10 \text{ m/s}^2 \times (2s)^2$$

$$45 = u \times 2s + 20 \text{ m}$$

$$\Rightarrow u = 12.5 \text{ m/s}$$

(ii) Velocities of the two balls when they hit the water:

If $v_1$ is the velocity of the first ball,

$$v_1 = u + at = u + gt$$

$$= 0 + 10 \text{ m/s}^2 \times 3 \text{ s} = 30 \text{ m/s}$$

If $v_2$ is the velocity of the second ball,

$$v_2 = 12.5 \text{ m/s} + 10 \text{ m/s}^2 \times 2 \text{ s}$$

$$= 32.5 \text{ m/s}$$

Thus, the two balls hit the water surface with different velocities. The second ball hits the water with higher velocity. (CBSE Marking Scheme, 2014) (3 + 2)

SUMMATIVE ASSESSMENT WORKSHEET-67

Ans. 1: $W = mg$. (1)
Ans. 2: 9.8 Newton.  
(1)
Ans. 3: At the poles.  
(1)
Ans. 4: At the equator.  
(1)

Ans. 5: \( a = \frac{F}{m} \). The mass of a stone is very small due to which the gravitational force produces a large acceleration in it. Due to very large mass of earth, the same gravitational force produces very small acceleration in the earth.  
(CBSE Marking Scheme, 2012) (2)

Ans. 6: He will observe more weight at the poles because \( g_{pole} > g_{equator} \). So, \( mg_p \) will be more than \( mg_e \).  
(1 + 1)

Ans. 7:  
\[
W_e = 300 \text{ N}; \quad g_e = 10 \text{ m/s}^2 \\
W_m = \frac{1}{6} W_e = \frac{1}{6} \times 300 = 50 \text{ N}
\]
As mass always remains constant therefore mass on moon = mass on earth = \( x \) units.  
(CBSE Marking Scheme, 2012) (1 + 1)

Ans. 8: Weight of body depends on mass of body and value of 'g' at that place  
\[ W = m \times g \]
Yes, in the centre of earth body has mass but no weight because value of \( g = 0 \).  
(1 + 1)

Ans. 9: Since, height of the tower,  
\[ h = 245 \text{ m} \]
Initial velocity of the particle,  
\[ u = 0 \text{ m/s} \]
(i) Time taken by the stone to reach the ground, \( t = ? \)
Using the equation,  
\[ h = ut + \frac{1}{2} gt^2 \]
\[ \Rightarrow 245 = 0 \times t + \frac{1}{2} \times 10 \times t^2 \]
\[ \Rightarrow t = 7 \text{ sec} \]
Thus, the measured time was incorrect.
(ii) Final velocity, when the stone touched the ground,  
Using the equation,  
\[ v = u + gt \]
\[ \Rightarrow v = 0 + 10 \text{ m/s}^2 \times 7s = 70 \text{ m/s} \]
(iii) By using the above given equations of motion, we draw the following table.

<table>
<thead>
<tr>
<th>Time (t)</th>
<th>Distance (s)</th>
<th>Velocity (v)</th>
<th>Acceleration ( a (= g) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 s</td>
<td>0 m</td>
<td>0 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>1 s</td>
<td>5 m</td>
<td>10 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>0 s</td>
<td>0 m</td>
<td>0 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>1 s</td>
<td>5 m</td>
<td>10 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>2 s</td>
<td>20 m</td>
<td>20 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>3 s</td>
<td>45 m</td>
<td>30 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>4 s</td>
<td>80 m</td>
<td>40 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>5 s</td>
<td>125 m</td>
<td>50 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>6 s</td>
<td>180 m</td>
<td>60 m/s</td>
<td>10 m/s²</td>
</tr>
<tr>
<td>7 s</td>
<td>245 m</td>
<td>70 m/s</td>
<td>10 m/s²</td>
</tr>
</tbody>
</table>

(iv) The distance-time graph, velocity-time graph and acceleration-time graph for the above table are given below:
SUMMATIVE ASSESSMENT WORKSHEET-68

Ans. 1: It will remain the same on the moon, i.e., 9.8 kg. (1)
Ans. 2: Gravitational force is attractive in nature always. (1)
Ans. 3: Weightlessness is a state when an object does not weigh anything. It occurs only when a body is in a state of free fall under the effect of only gravity. (1)

Ans. 4:

\[ F_A = \frac{G \cdot M_{\text{sun}} \times m_a}{(2d)^2} \text{ and} \]
\[ F_B = \frac{G \cdot M_{\text{sun}} \times m_a}{d^2} \]

\[ \frac{F_A}{F_B} = \frac{G \cdot \frac{M_{\text{sun}} \times m_a}{4d^2}}{G \cdot \frac{M_{\text{sun}} \times m_a}{d^2}} \]

But \( m_a = 2m_B \) (1)

\[ \therefore \frac{F_A}{F_B} = \frac{1}{2} \]

\[ F_A : F_B = 1 : 2 \] (CBSE Marking Scheme, 2012) (1)

Ans. 5:

Height of tower, \( h = 19.6 \) m.
Initial velocity \( u = 0 \) m/s
Final velocity, \( v = ? \)
Acceleration due to gravity, \( g = 9.8 \) m/s\(^2\)
\[ v^2 = u^2 + 2gh \quad (½) \]
\[ v^2 = 0 + 2 \times 9.8 \times 19.6 \quad (½) \]
\[ v^2 = 19.6 \times 19.6 \text{ m} \quad (½) \]
\[ v = 19.6 \text{ m/s} \quad \text{(CBSE Marking Scheme, 2012)} \]

**Ans. 6**: (i) It is due to resistance offered by air on paper sheet.

(ii) \( g_p > g_e \) because \( R_e > R_p \).

(ii) It means when a body falls freely under gravity its velocity increases by 9.8 m/s in every one second.

\[ v^2 = 0 + 2 \times 9.8 \times 19.6 \quad (½) \]
\[ v^2 = 19.6 \times 19.6 \text{ m} \quad (½) \]
\[ v = 19.6 \text{ m/s} \quad \text{(CBSE Marking Scheme, 2012)} \]

**Ans. 7**: \( R_p \) radius of the planet = \( 6.4 \times 10^6 \text{ m} \)

\[ M_p = \text{mass of the planet} \]
\[ = 6 \times 10^{24} \text{ kg} \]
\[ G = \text{Universal Gravitational Constant} \]
\[ = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2 \]
\[ m = \text{mass of object} = 1 \text{ kg} \]

According to Newton’s Law of gravitation, the gravitation force \( (F) \) is

\[ F = \frac{GM_p m}{R_p^2} \]

\[ F = \frac{(6.67 \times 10^{-11})(6 \times 10^{24})(1)}{(6.4 \times 10^6)^2} \]

\[ F = 9.8 \text{ N} \quad \text{(CBSE Marking Scheme, 2012)} \]

**Ans. 8**: (a) As we know, Weight of an object is given by \( W = mg \), where ‘\( m \)’ is mass of the object ‘\( g \)’ is the acceleration due to gravity.

As we know, the weight of an object is less at the equator than at the poles as the magnitude of ‘\( g \)’ is less at the equator than at the poles. Therefore, his friend will not agree with weight of the gold bought at the poles when measured at equator.

(b) No, he was not a cheater. Might be he was not aware of the fact that value of \( g \) is less at the equator.

**Ans. 9**: The force of attraction between two bodies of masses \( m_1 \) and \( m_2 \) and separated by distance \( r \) is given by:

\[ F = \frac{G m_1 m_2}{r^2} \]

Where \( G \) is the universal constant in nature.

This force is known as gravitational force. The gravitational force is directly proportional to the product of the masses of two bodies and inversely proportional to the square of the distance between them.

All bodies fall with the same acceleration due to gravity whatever their masses be. So, two bricks tied together will not fall faster than a single brick under the action of gravity.

\[ \text{(1 + 2 + 2)} \]

**SUMMATIVE ASSESSMENT**

**Ans. 1**: Weight is a vector quantity.

**Ans. 2**: The acceleration due to gravity is more at the poles than at the equator. The time taken by a body if the acceleration due to gravity is more when the initial velocities and the distance travelled are the same. So, when dropped from the same height a body reaches the ground quicker at poles than at the equator.

**Ans. 3**:

\[ g_{\text{planet}} = \frac{1}{2} g_{\text{earth}} = 5 \text{ m/s}^2 \]

\[ W = mg \quad (½) \]

So,

\[ W_{\text{planet}} = 50 \times 5 = 250 \text{ N} \quad (\text{CBSE Marking Scheme, 2012}) \]
Ans. 4: Since velocity increases by 9.8 m/s after every one second
(a) Velocity will be 19.6 m/s

(b) Force on the object = weight of the body
\[ F = G \frac{Mm}{d^2} \]
\[ mg = G \frac{Mm}{d^2} \]
\[ g = \frac{GM}{d^2} \]

(CBSE Marking Scheme, 2012) 1

Ans. 5: Initial velocity = \( u = 20 \) m/s

Maximum height the ball will reach \((h) = ?\)

Using equation \( v^2 = u^2 + 2gh \)

\( v = 0 \) at maximum height

\[ h = \frac{-u^2}{2g} = \frac{-(20)^2}{2(-10)} \]
\[ = \frac{400}{20} = 20 \text{ m.} \]

This means ball will reach the height of 20 m and come back. It will pass the window two times.

Now to calculate the time, ball will take to reach 15 m height,

Using equations, \( h = ut - \frac{1}{2} gt^2 \)

\[ 15 = 20t - \frac{1}{2}(10)t^2 \]

\[ 5t^2 - 20t + 15 = 0 \]

\[ (t - 1)(t - 3) = 0 \]

\[ t = 1, 3 \]

Thus, ball will pass the window at 1 second and 3 seconds respectively.

(CBSE Marking Scheme, 2013) (3)

Ans. 6: Initial velocity of the ball \((u) = 49 \) m/s

Final velocity of the ball \((v) = 0 \) m/s

Acceleration for upward motion \((a) = -9.8 \text{ m/s}^2\)

(a) Maximum height reached by the ball = \( s \)

\[ v^2 - u^2 = 2as \]

\[ 0 - (49 \text{ m/s})^2 = 2 \times (-9.8 \text{ m/s}^2) \times s \]

\[ s = \frac{2401}{19.6} \text{ m} = 122.5 \text{ m} \]

(b) Time taken to reach the maximum height, \( t \)

\[ v = u + at \]

\[ t = \frac{(-49 \text{ m/s})}{(-9.8 \text{ m/s}^2)} \]

[As final velocity, \( v = 0 \text{ m/s} \) = 5 s]

Since, same time is taken to reach the ground from the maximum height.

So, total time taken to return to the ground

\[ = (2 \times 5) s = 10 \text{ s} \]

(CBSE Marking Scheme, 2013) (3)
Ans. 7: Given, 
\[ h = 10 \text{ m} \quad g = 20 \text{ m/s}^2 \]
\[ v^2 = u^2 + 2gh \]
\[ v^2 = 0 + 2 \times 20 \times 10 \]
\[ v^2 = 400 \]
\[ v = 20 \text{ m/s} \]

Now;
\[ v = u + gt \]
\[ 20 = 0 + 20t \]
\[ t = 1 \text{ sec.} \]

(CBSE Marking Scheme, 2012) \(\frac{1}{2}\)

FORMATIVE ASSESSMENT WORKSHEET-70

Note: Students should do this activity themselves.
TOPIC-1
Plant and Animal Breeding, Selection for Quality Improvement and Management.

SUMMATIVE ASSESSMENT WORKSHEET-71

Ans. 1 : Photosynthesis. (CBSE Marking Scheme, 2014) (1)

Ans. 2 : Potato and Rice. (CBSE Marking Scheme, 2014) (½ + ½)

Ans. 3 : Murrah and Mehsana. (1)

Ans. 4 : The technique is embryo transfer. (1)

Ans. 5 : There is good scope for fisheries in India because:
(a) India has 1·6 million hectares of inland water bodies.
(b) Its coastline is 7500 km long. (1 + 1)

Ans. 6 : Chicken C will have maximum laying output. This is because it is exposed to moderate sunlight. Moderate light intensity and duration has a favourable effect on the egg laying output of the hens. (1 + 1)

Ans. 7 : Layers are the birds, reared for egg production. Limestone is added in their diet to form the shell of eggs

Other example : Proteins and roughage (CBSE Marking Scheme, 2014) (1 + 1 + 1)

Ans. 8 : Macronutrients are nutrients required in large quantity. e.g., nitrogen. Micronutrients are nutrients required in small quantity. e.g., boron. (CBSE Marking Scheme, 2014) (1½ + 1½)

Ans. 9 : Sustainable agriculture is the successful management of resources for agriculture to satisfy the changing human needs, while maintaining or enhancing the quality of environment and conserving natural resources. The scientific practices that you can undertake to obtain higher yield from agriculture are:
(i) Mixed farming
(ii) Intercropping
(iii) Crop rotation
(iv) Integrated farming practices (3 + 2)

OR

Definition of sustainable agriculture.
(i) Mixed farming
(ii) Intercropping
(iii) Crop rotation (CBSE Marking Scheme, 2014)

SUMMATIVE ASSESSMENT WORKSHEET-72

Ans. 1 : National Dairy Research Institute (NDRI) at Karnal, Haryana. (1)

Ans. 2 : Cow B as it has both roughage and concentrates in its diet. (1)

Ans. 3 : He/she should opt for the milk from the Murrah as its fat content (< 7%) is lesser than that of the Surti (8% – 12%). (1)

Ans. 4 : Increased food grain production. (1)
Ans. 5: Advantages of Holstein-Friesian over the Red Sindhi are:
(a) Average milk production is more.
(b) Lactation periods extend throughout the year. (1 + 1)

Ans. 6: (a) Improved varieties and cross-breeds have been developed,
(b) Proper health and disease control have also improved the yield. (1 + 1)

Ans. 7: There are three ways:
(i) **Crop Variety Improvement**: This approach aims at finding a crop variety that can give a good yield variety that can produce high yield under different conditions and can withstand different situations like weather changes, soil quality, water availability etc.
(ii) **Crop Production Management**: Farmers have to look into the financial aspect of a crop. They have to think about the capital to invest on the land and the benefits they get from it. It is the financial condition that allows farmers to grow a particular crop. The purchasing capacity for inputs decides cropping system and production practices.
(iii) **Crop Protection Management**: Field crops are infested by a large number of weeds, insect pests and diseases. If they are controlled at correct time, it will ensure increased crop production. (1 + 1 + 1)

Ans. 8: Animal husbandry can be defined as the science of rearing, feeding, caring, breeding and utilisation of animals.

**Needs of improving livestock production**:
(i) It is required to meet the increasing demands of animal based goods like milk, meat, egg, leather etc.
(ii) Animal husbandry sets guidelines for proper management and systematic approach to animal rearing.
(iii) It also helps in proper utilisation of animal wastes like animal dung. (1 + 2)

Ans. 9: While designing a shelter for cattle we must have a shelter that is:
(a) Well ventilated,
(b) Protects animals from rain, heat and cold,
(c) The floor of the cattle shed needs to be sloping so as to stay dry and facilitate cleaning. (CBSE Marking Scheme, 2012) (1 + 1 + 1)

Ans. 10: (i) **Higher Yield**: To increase the productivity of crop per acre.
(ii) **Improved Quality**: Quality considerations such as baking quality, protein quality, oil quality and preserving quality of crop products vary from crop to crop.
(iii) **Biotic and Abiotic Resistance**: Crop production can go down due to biotic and abiotic stresses under different situations. Varieties resistant to these stresses can improve crop production.
(iv) **Change in Maturity Duration**: The shorter the duration of the crop from sowing to harvesting, the more economical is the variety.
(v) **Wider Adaptability**: Developing varieties for wider adaptability will help in stabilising the crop production under different environmental conditions.
(vi) **Desirable Agronomic Characteristics**: Developing varieties of desired agronomic characters helps to give higher productivity. (5)

**SUMMATIVE ASSESSMENT WORKSHEET-73**

<table>
<thead>
<tr>
<th>Ans.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Better and more efficient use and availability of milk. (1)</td>
</tr>
<tr>
<td>2</td>
<td>Duration of sunlight. (1)</td>
</tr>
<tr>
<td>3</td>
<td>From the month of June to October. (1)</td>
</tr>
<tr>
<td>4</td>
<td>Sportsmen and wrestlers are recommended to have egg, meat and fish as a part of their diet because these contain high amounts of protein which is essential for growth and development of muscles. (2)</td>
</tr>
<tr>
<td>5</td>
<td>1. – b, 2. – d, 3. – c, 4. – a. (1 + 1)</td>
</tr>
</tbody>
</table>
**Ans. 6 :**
(a) Indigenous breed — Aseel,
Exotic breed — Leghorn.
(b) Egg, chicken meat,
(c) Vitamin A, Vitamin K.  
(CBSE Marking Scheme, 2012)  \( \frac{1}{2} \times 6 \)

**Ans. 7 :**
(a) Two characteristics of an ideal cattle shed are: well roofed/well ventilated/sloppy floor  \( \text{(any two)} \)
(b) Milch animals, draught animals.
(c) Red Sindhi, Sahiwal  
(CBSE Marking Scheme, 2012)  \( \frac{1}{2} \times 6 \)

**Ans. 8 :**
(a) Diseases reduce milk production.
(b) Diseased cattle don’t take regular feed and don’t show normal posture.
(c) Concentrates: Animal feed with high protein and low fibre content with other nutrients.  
(CBSE Marking Scheme, 2012)  \( 1 \times 3 \)

**Ans. 9 :**
(a) Two advantages of composite fish farming are:
   (i) A combination of five or six fish species is used in single fish pond.
   (ii) Fish species have different food habits. Different food habits are advantageous, as all the food in the pond is consumed by the fish.
(b) Two components of cattle feed are:
   (i) **Roughage**: This is largely fibrous, containing low nutrients. e.g., green fodder, silage hay and legumes.
   (ii) **Concentrates**: These are low in fibre and contain relatively high levels of proteins and other nutrients. e.g., cereals like gram and bajra.
(c) Two milch breeds of cow are Jersey and Brown swiss.  \( 2 + 2 + 1 \)

**SUMMATIVE ASSESSMENT WORKSHEET-74**

**Ans. 1 :**
(1) Choice of seeds, (2) Nurturing of crop plants and (3) Protection of the growing and harvested crops from loss.  \( 1 \)

**Ans. 2 :**
Genetically modified crops.  \( 1 \)

**Ans. 3 :**
Higher yield and improved quality.  \( 1 \)

**Ans. 4 :**
We can divide the practices involved in farming into three stages. The first is the choice of seeds for planting. The second is the nurturing of the crop plants. The third is the protection of the growing and harvested crops from loss. Thus, the major groups of activities for improving crop yields can be classified as:
- Crop variety improvement
- Crop production improvement
- Crop protection management.  \( 2 \)

**Ans. 5 :**
Animal husbandry is essential because of the following reasons:
(1) To increase milk production, which automatically fulfils the need of the growing population. It also increases the production of various milk products like butter and cheese.
(2) To increase egg and meat production, which are highly nutritious.
(3) To increase fish production.
(4) For the proper utilization of animals wastes.  \( \frac{1}{2} \times 4 \)

**Ans. 6 :**
The animals which are used for farm labour are called draught animals.
Desired qualities: Long lactation period and excellent resistance to diseases.  
(CBSE Marking Scheme, 2012)  \( 1 + 2 \)

**Ans. 7 :**
(a) Broilers are raised for chicken, meat and egg. Layers are raised for eggs.
(b) Broilers need more proteins with adequate fat. Egg layers are given more of vitamin A and K.
(c) Virus, bacteria, fungi, parasites, nutritional deficiencies.  
(CBSE Marking Scheme, 2012)  \( 1 + 1 + 1 \)
Ans. 8: Expected Answer/Value Points of Test item - 51.
(i) Period of milk production after the birth of calf.
(ii) Jersey, Brown Swiss
(iii) Scientific temper, concern for others, cooperation etc. (CBSE Marking Scheme, 2012) (3)

Detailed Answer:
(i) Lactation period is the period of milk production after the birth of calf.
(ii) Jersey, Brown Swiss.
(iii) Scientific temper, concern for others, cooperation etc.

Ans. 9: (a) Balanced diet promotes the health and milk output of dairy animals.
(b) 16 nutrients.
(c) Nutrients supplied by:
   Air – Carbon, oxygen,
   Water – Hydrogen, oxygen,
   Soil – Nitrogen, phosphorus, potassium together with other macro & micronutrients.
   (CBSE Marking Scheme, 2012) (1 + 1 + 3)

TOPIC-2
Use of Fertilizers and Manures; Irrigation, Protection from Pests and Diseases; Organic Farming, Types of Farming.

SUMMATIVE ASSESSMENT WORKSHEET-75

Ans. 1: Farm Yard Manure. (1)
Ans. 2: (i) Compost and vermicompost.
   (ii) Green manure. (½ + ½)
Ans. 3: It is a farming system with minimal or no use of chemicals and with maximum input of organic manures, recycled farm wastes and bio-agents with healthy cropping system. (1)
Ans. 4: Differences between Fertilizers and Manure:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Fertilizers</th>
<th>Manure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>They are chemical in nature and these are manufactured in factories.</td>
<td>Manure is an organic substance that is obtained from decomposition of vegetable and animal wastes.</td>
</tr>
<tr>
<td>2.</td>
<td>Microbes are not needed for their formation.</td>
<td>Microbes are needed to form manure since they degrade the organic substances.</td>
</tr>
<tr>
<td>3.</td>
<td>Easy to transport, store and apply to crops.</td>
<td>It is difficult to transport, store and apply manure to crops.</td>
</tr>
<tr>
<td>4.</td>
<td>They do not restore soil texture.</td>
<td>They restore soil texture.</td>
</tr>
<tr>
<td>5.</td>
<td>They do not help in retention of water.</td>
<td>They help in the retention of water.</td>
</tr>
</tbody>
</table>

(2)

Ans. 5: Fresh water resources: Lakes, rivers, ponds.
Brackish water resources: Estuaries, lagoons, creeks. (1½ + 1½)
Ans. 6: Mixed cropping is the growing of two or more crops simultaneously on the same piece of land.
Two advantages are:
(i) Reduces risk
(ii) Gives variety in the crop field. 3
Ans. 7:  
(i) Weeds damage the crops by retarding their growth. They compete with the main crop for air, water and other available nutrition.
(ii) *Xanthium*, *Cyperinus rotundus*.
(iii) Vigilance and awareness.  

(ans. 7: (i) 1 + (ii) 1 + (iii) 1)

Ans. 8: Five methods by which we can increase the yield of crops and livestock are as follows:

(1) By including better crop management like mixed farming, crop and fodder yields can be improved.
(2) By improved varieties of seeds etc. and cropping practices, we can improve the yield of crops which indirectly provides improved food for livestock.
(3) By minimizing the application of fertilizers and pesticides.
(4) By adopting integrated farming practices, e.g., combining agriculture with livestock.
(5) By promoting the usage of livestock excreta for production of compost, we can supply required nutrients through soil.

(ans. 8: 5 × 1)

SUMMATIVE ASSESSMENT WORKSHEET-76

Ans. 1: Neem.  

(ans. 1: 1)

Ans. 2: Because of scarcity or irregular distribution of rains.  

(ans. 2: 1)

Ans. 3: Growing different crops on the same field or a piece of land in a pre-planned succession is called crop rotation.

For crop rotation, the selection of crops depends on the:

(I) Type of soil.
(2) Nutrient status.
(3) Availability of water through rain or irrigation.
(4) Length of rainy season.
(5) Duration of crop-short or long, and
(6) Availability of inputs like fertilizers, pesticides, manpower etc.  

(any 4)  

(ans. 3: ½ × 4)

Ans. 4: Weeds are unwanted plants in the cultivated field.

*e.g., Xanthium*, *Parthenium*, *Cypernicus rotundus*.  

Weeds take up nutrients and reduce the growth of the crop. Therefore their removal is necessary.

Control method: Use of herbicides.  

(½ × 3 + 1 + ½)

Ans. 5:  

(a) ![Diagram of Neem leaves](image)

(b) Soyabean + maize, finger millet + cowpea

(c) (i) It ensures maximum utilization of nutrients.

(ii) It prevents pest and diseases from spreading to all plants.  

(ans. 5: (i) 1 + (ii) 1)

Ans. 6:  

(i) Biofertilizers are the substances containing living micro-organisms that add nutrients to the soil making it fertile. e.g., *Rhizobium*.

(ii) When applied to seeds soil or plants, it colonizes the interior of the plant and promotes growth by increasing the availability of nutrients to the plant.

(iii) Rahila was curious to know more about these particular organism and their mechanism.  

(ans. 6: (i) 1 + (ii) 1 + (iii) 1)

Ans. 7:  

(a) Combination of 5 or 6 fish species in a single fish pond.

(b) Species are selected so that they do not compete for food. Food available in all parts of the pond is utilized.

This increases fish yield

(c) Hormonal Stimulation  

(CBSE Marking Scheme, 2015)  

(ans. 7: (a) 1 + (b) 1 + (c) 5)
Detailed Answer:
(a) Composite fish culture is the poly culture system in which combination of 5 or 6 fish species are selected and grown in a single fish bond.
(b) The selection of different species of fish is done so that they do not compete for food and the food available in all the parts of the pond is utilized. This increases the fish yield.
(c) Hormonal stimulation.

SUMMATIVE ASSESSMENT WORKSHEET-77

Ans. 1: It reduces risk and gives some insurance against failure of one of the crops. (1)
Ans. 2: It is growing two or more crops simultaneously on the same field in a definite pattern. (1)
Ans. 3: Following are the main advantages of mixed farming:
(1) The risk of complete crop failure is minimized due to uncertain monsoon.
(2) Higher yield is obtained with better soil fertility.
(3) It provides work to all the members of a family throughout the year.
(4) By adopting exact combination in mixed farming, a variety of produce can be obtained to fulfill family needs. (1/2 × 4)
Ans. 4: Due to biotic factors like insects, rodents, fungi, mites, bacteria and abiotic factors like inappropriate moisture and temperature in the place of storage, there is degradation in quality, loss in weight, poor germinability, discolouration of produce, all leading to poor marketability. So, preventive and control measures are used before grains are stored for future use, which include strict cleansing of the produce before storage, proper drying of the produce first in sunlight and then in shade and fumigations by using chemicals that kill pests. (1 + 1)
Ans. 5: Crop rotation: Growing of different crops on a piece of land in a pre planned succession is called crop rotation. The availability of moisture and irrigation facilities decides the choice of the crop to be cultivated after one harvest. (CBSE Marking Scheme, 2012) (1 + 1 + 1)
Ans. 6: (i) To take up nutrients and reduce the growth of crop.
(ii) Xanthium, Parthenium, Cyperinus rotundus
(iii) Value associated: family bonding, sharing knowledge. (CBSE Marking Scheme, 2014) (1 + 1 + 1)
Ans. 7: Three different cropping patterns, namely mixed cropping, intercropping, and crop rotation are generally practised.
(i) Mixed cropping allows two or more crops to be sowed simultaneously in the same land. Wheat and gram, wheat and mustard, ground nut and sunflower etc. are some common examples of mixed cropping. Mixed cropping also increases soil fertility by maintaining microbial diversity. In mixed cropping, crops are chosen in such a way that they require different amounts of minerals.
(ii) Intercropping allow farmers to grow two or more crops simultaneously in the same field in a definite pattern. For example, cauliflower and chilli plants are grown together in alternating rows. To ensure the maximum utilization of nutrients applied, crops are selected in such a way that their nutrient requirements are different. Other examples include soyabeen and maize, finger miller (bajra) and cowpea (lobia) etc.
(iii) Crop rotation is the practice of growing two or more varieties of crops in the same region in sequential seasons. A common example of crop rotation is to cultivate maize followed by soyabean. This system also helps in preventing crops from pests and diseases. The crops selected, vary in nutrient requirements. This ensures complete and uniform utilization of nutrients. (1 + 4)

SUMMATIVE ASSESSMENT WORKSHEET-78

Ans. 1: Maize-potato-sugarcane-peas. (1)
Ans. 2: Diseases in plants are caused by pathogens such as bacteria, fungi and viruses. (1)
Ans. 3 : Insects, rodents, fungi, mites and bacteria.

Ans. 4 : Nitrogen fixing bacteria e.g., Rhizobium is present in the roots of leguminous plants. Therefore, they do not require nitrogenous fertilizers.

Ans. 5 : Manures contain organic matter and supply nutrients to soil. (1)
Kinds of manure : Green manure, compost or vermicompost.
(\textit{any two}) (\(\frac{1}{2} + \frac{1}{3}\))
Manure helps in enriching soil with nutrients and organic matter and thus increases soil fertility.

(CBSE Marking Scheme, 2012) (1)

Ans. 6 : All the plants require specific nutrients for their growth to increase the yield. The soil can be enriched by supplying these nutrients. Manure is used because it helps in enriching the soil with nutrients, organic matter and increasing soil fertility. Fertilizers are used to ensure good vegetative growth, giving rise to healthy plants. This is not a correct practice because excess fertilizers can lead to water pollution.

(CBSE Marking Scheme, 2012) (1 + 1 + 1)

Ans. 7 : (a) Composite fish culture.
(b) In such a system, a combination of five or six fish species is bred in a single fish pond. These species are selected so that they do not compete for food among them. As a result, food available in all parts of the pond is used. This increases the fish yield from the pond.
(c) Most of the fish breed in monsoon only and even if fish seed is collected from wild it can be mixed with other species as well. So major problem is lack of availability of good food. This problem can be overcome by breeding these fishes using hormonal stimulation.

(1 + 2 + 2)

Ans. 8 : (a) Biotic factors like insects, rodents, fungi, mites and abiotic factors like inappropriate temperature and moisture cause degradation in quality, loss in weight, poor germination, discoloration of produce, all leading to poor marketability.
(b) The preventive and control measures include strict cleaning of the produce before storage, proper drying of the produce first in sunlight and then in shade and fumigation using chemicals.
(c) \textit{Xanthium} and \textit{Parthenium}.

(2 + 2 + 1)

PRACTICAL BASED QUESTIONS WORKSHEET-79

Ans. 1 : (a) Colour and appearance gets improved.
Ans. 2 : (b) turned blue black.
Ans. 3 : (d) Pulses to improve colour and appearance.
Ans. 4 : (b) Carbohydrates.
Ans. 5 : (a) the dal is free form adulterant.
Ans. 6 : (c) adding a few drops of iodine solution to food sample.
Ans. 7 : (d) Starch in test-tube A, Metanil yellow in test-tube B.
Ans. 8 : (d) Starch
Ans. 9 : (c) Potato contains starch.
Ans. 10 : (c) Potato contains starch.
Ans. 11 : The materials required are :
Potato, pigeon pea, iodine solution, concentrated hydrochloric acid, petridish, test tube, knife and a dropper.

(2)

Ans. 12 : Starch is a carbohydrate that produces blue colour when brought in contact with the iodine solution.

(2)

FORMATIVE ASSESSMENT WORKSHEET-80

Note : Students should do this activity themselves.