

SAMPLE CONTENT



CBSE

COMPETENCY Based Questions

SCIENCE

790 Practice Questions

CHAPTERWISE & SUBTOPICWISE FOR SECTION A & E

As per the latest circular and sample paper
released by CBSE

TYPES OF QUESTIONS:

- Multiple Choice Questions
- Assertion Reason Questions
- Case/source Based Questions



Class IX

Target Publications[®] Pvt. Ltd.

CBSE COMPETENCY Based Questions

SCIENCE

(SECTION A & E)

Class IX

Salient Features

- ☞ Written as per the Latest Syllabus
- ☞ Includes '790' Questions for practice
- ☞ Subtopic-wise segregation of questions for efficient practice
- ☞ Extensive coverage of **Multiple Choice Questions, Assertion-Reason and Case/Source Based Questions**
- ☞ Covers selective Textual Exercise Questions and Exemplar Questions
- ☞ Quick Review of each chapter to facilitate quick revision
- ☞ Contains detailed Solutions to difficult MCQs and Assertion & Reason type of questions
- ☞ 6 Self-Assessment Tests (Solutions can be accessed through QR code)
- ☞ **Important inclusions:**
 - **Explanation for Better Understanding** for a complete and thorough grasp of the concept
- ⚠ **Caution** apprises students about commonly made mistakes
- 🔗 **Connections** to interlink concepts covered in different chapters

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PREFACE

Competency Based Assessment is recently adopted by CBSE from National Education Policy 2020 for Annual Examination of Class IX. Target's "**CBSE Competency Based Questions Science: Class IX**" is a complete, thorough, critically analysed, and extensively drafted book to cater to Competency Based Assessment for sections A and E of the Question paper for the Annual Examination.

Since Competency Focused Questions in the form of MCQs/Case Based Questions, Source-Based Integrated Questions, or any other type constitute **50%** (40 out of 80 marks) of the weightage of the question paper, we wanted to create a book that would specifically strengthen the competency of students for the two sections consisting of MCQs, Assertion-Reason, and Case/Source Based Questions.

This book aims to provide comprehensive and thorough preparation material of MCQs, Assertion-Reason and Case/Source Based Questions to excel in the exam.

The flow of subtopics within the chapter is purposely kept aligned with the latest NCERT textbook to foster a sense of familiarity in the students. Complete coverage of topics in this book would prove to be a strong source of foundational practise for the Annual Examination.

The **Subtopic-wise** segregation for each chapter of this book helps the students practise questions smoothly and at their own pace.

Each chapter begins with **Synopsis** to offer crisp revision to students in efficient form of pointers, tables, charts, etc., followed by a **Quick Review**.

The question types **Multiple Choice Questions, Assertion-Reason** and **Case/Source based Questions** have been specially created and compiled keeping the following objectives in mind: to help students revise concepts as well as prepare them to solve complex questions that require strenuous effort and understanding of multiple-concepts. The assortment of questions also encompasses questions based on real life situations and application based questions and promotes higher order thinking in students.

To aid students, solutions are provided for questions wherever deemed necessary. Certain solutions are supplied with the feature, '**Explanation for Better Understanding**' to improve the comprehensive understanding of the concept by students. '**Caution**' is added to make students watchful against commonly made mistakes. Also, '**Connections**' are furnished to enable students to perceive the interlinking of concepts covered in different chapters and prepare them for possible coalition questions.

Self-Assessment Tests (solutions provided in PDF format via QR codes) placed at the end of the book allow students to gauge their preparedness for each chapter.

We hope that the book builds up the necessary knowledge and skillset in the students required to crack **Multiple Choice Questions, Assertion-Reason** and **Case/Source based Questions** and boosts their confidence required to succeed in the examination.

Publisher

Edition: First

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

Please write to us on: mail@targetpublications.org

A book affects eternity; one can never tell where its influence stops.

Disclaimer

This reference book is transformative work based on Science Textbook for class IX, Rationalised 2023-24 published by the National Council of Educational Research and Training (NCERT) and NCERT Exemplar: 2018 published by the National Council of Educational Research and Training (NCERT). We the publishers are making this reference book which constitutes as fair use of textual contents which are transformed by adding and elaborating, with a view to simplify the same to enable the students to understand, memorize and reproduce the same in examinations.

This work is purely inspired upon the course work as prescribed by the National Council of Educational Research and Training (NCERT). Every care has been taken in the publication of this reference book by the Authors while creating the contents. The Authors and the Publishers shall not be responsible for any loss or damages caused to any person on account of errors or omissions which might have crept in or disagreement of any third party on the point of view expressed in the reference book.

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COURSE STRUCTURE 2023 - 24

CLASS IX (Annual Examination)

Marks: 80

Unit No.	Unit	Marks
I	Matter - Its Nature and Behaviour	25
II	Organization in the Living World	22
III	Motion, Force and Work	27
IV	Food; Food Production	06
	Total	80
	Internal assessment	20
	Grand Total	100

Theme: Materials

Unit I: Matter-Nature and Behaviour

Definition of matter; solid, liquid and gas; characteristics - shape, volume, density; change of state- melting (absorption of heat), freezing, evaporation (cooling by evaporation), condensation, sublimation.

Nature of matter: Elements, compounds and mixtures. Heterogeneous and homogenous mixtures, colloids and suspensions. Physical and chemical changes.

Particle nature and their basic units: Atoms and molecules, Law of Chemical Combination, Chemical formula of common compounds, Atomic and molecular masses.

Structure of atoms: Electrons, protons and neutrons, Valency, Atomic Number and Mass Number, Isotopes and Isobars.

Theme: The World of the Living

Unit II: Organization in the Living World

Cell - Basic Unit of life:

Cell as a basic unit of life; prokaryotic and eukaryotic cells, multicellular organisms; cell membrane and cell wall, cell organelles and cell inclusions; chloroplast, mitochondria, vacuoles, endoplasmic reticulum, Golgi apparatus; nucleus, chromosomes - basic structure, number.

Tissues, Organs, Organ System, Organism:

Structure and functions of animal and plant tissues (only four types of tissues in animals; Meristematic and Permanent tissues in plants).

Theme: Moving Things, People and Ideas

Unit III: Motion, Force and Work

Motion:

Distance and displacement, velocity; uniform and non-uniform motion along a straight line; acceleration, distance-time and velocity-time graphs for uniform motion and uniformly accelerated motion, elementary idea of uniform circular motion.

Force and Newton's laws:

Force and Motion, Newton's Laws of Motion, Action and Reaction forces, Inertia of a body, Inertia and mass, Momentum, Force and Acceleration.

Gravitation:

Gravitation; Universal Law of Gravitation, Force of Gravitation of the earth (gravity), Acceleration due to Gravity; Mass and Weight; Free fall.

Floatation:

Thrust and Pressure. Archimedes' Principle; Buoyancy.

Work, energy and power:

Work done by a Force, Energy, power; Kinetic and Potential energy; Law of conservation of energy (excluding commercial unit of Energy).

Sound:

Nature of sound and its propagation in various media, speed of sound, range of hearing in humans; ultrasound; reflection of sound; echo.

Theme: Food**Unit IV: Food Production**

Plant and animal breeding and selection for quality improvement and management; Use of fertilizers and manures; Protection from pests and diseases; Organic farming.

Note:

The NCERT text books present information in boxes across the book. These help students to get conceptual clarity. However, the information in these boxes would not be assessed in the year-end examination.

PRACTICALS

Practicals should be conducted alongside the concepts taught in theory classes.

(LIST OF EXPERIMENTS)

1. Preparation of: **Unit-I**
 - a. a true solution of common salt, sugar and alum
 - b. a suspension of soil, chalk powder and fine sand in water
 - c. a colloidal solution of starch in water and egg albumin/milk in water and distinguish between these on the basis of
 - transparency
 - filtration criterion
 - stability
2. Preparation of **Unit-I**
 - a. A mixture
 - b. A compoundusing iron filings and sulphur powder and distinguishing between these on the basis of:
 - i. appearance, i.e., homogeneity and heterogeneity
 - ii. behaviour towards a magnet
 - iii. behaviour towards carbon disulphide as a solvent
 - iv. effect of heat
3. Perform the following reactions and classify them as physical or chemical changes: **Unit-I**
 - a. Iron with copper sulphate solution in water
 - b. Burning of magnesium ribbon in air
 - c. Zinc with dilute sulphuric acid
 - d. Heating of copper sulphate crystals
 - e. Sodium sulphate with barium chloride in the form of their solutions in water
4. Preparation of stained temporary mounts of (a) onion peel, (b) human cheek cells & to record observations and draw their labeled diagrams. **Unit-II**
5. Identification of Parenchyma, Collenchyma and Sclerenchyma tissues in plants, striped, smooth and cardiac muscle fibers and nerve cells in animals, from prepared slides. Draw their labeled diagrams. **Unit-II**
6. Determination of the melting point of ice and the boiling point of water. **Unit-I**
7. Verification of the Laws of reflection of sound. **Unit-III**
8. Determination of the density of solid (denser than water) by using a spring balance and a measuring cylinder. **Unit-III**
9. Establishing the relation between the loss in weight of a solid when fully immersed in **Unit-III**
 - a. Tap water **Unit-III**
 - b. Strongly salty water with the weight of water displaced by it by taking at least two different solids.
10. Determination of the speed of a pulse propagated through a stretched string/slinky (helical spring). **Unit-III**
11. Verification of the law of conservation of mass in a chemical reaction. **Unit-III**

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- Note:**
- *** mark represents *Textual question*.
 - ⌘** mark represents *NCERT Exemplar question*.

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Content and Concepts

- | | |
|--|----------------------------------|
| 1.0 Introduction | 1.3 States of Matter |
| 1.1 Physical Nature of Matter | 1.4 Can Matter Change its State? |
| 1.2 Characteristics of Particles of Matter | 1.5 Evaporation |

Synopsis

1.0 Introduction

Matter: Anything around us which is made up of material that occupies space and has a mass is called matter.

E.g. The food we eat, the air we breathe, food, stones, clouds, stars, etc.

1.1 Physical Nature of Matter

- Matter is made up of extremely small particles which are not visible to naked eye.
- The smallest particle of matter cannot be divided further into smaller particles.

**Connections**

In chapter 3, you will study in details on the smallest particles of matters i.e., atoms and molecules.

1.2 Characteristics of Particles of Matter

- Particles of matter have space between them. For example, when sugar is added to water, sugar molecules get in to the spaces between the water molecules.
- Particles of matter are in continuous state of motion. Due to this continuous motion, particles possess kinetic energy. Kinetic energy increases with increase in temperature. Particles with higher kinetic energy move faster.
- Particles of matter intermix on their own with each other. This intermixing of particles of two different types of matter on their own is called **diffusion**. On heating, diffusion becomes faster.
- Particles of matter are attracted to each other with a force called intermolecular force.

**Connections**

In chapter 2, you will study in details on types of matters; pure substance and mixture.

1.3 States of Matter

Property	Solids	Liquids	Gases
Shape	Definite shape	No fixed shape. They take up the shape of container in which they are stored.	No definite shape. They take up the shape of container in which they are stored.
Volume	Definite volume	Definite volume	No definite volume. They acquire volume of container in which they are stored.
Compressibility	Negligible compressibility	Negligible compressibility	Highly compressible
Rigidity	Rigid	Not rigid	Not rigid
Boundary	Definite boundary	No definite boundary	No definite boundary
Intermolecular forces	Maximum	Intermediate	Minimum
Kinetic energy	Minimum	Intermediate	Maximum



1.4 Can Matter Change its State?

- **Solid to liquid:**
When the energy supplied as heat overcomes the intermolecular forces of attraction between the solid particles, the particles leave their fixed positions and move freely. This is the stage when the solid melts and converts into the liquid.
- **Melting point:** The temperature at which a solid melts to convert into a liquid at atmospheric pressure is called its melting point.
- **Fusion:** The change of solid state into liquid state at melting point is called fusion.
- **Latent heat of fusion:**
During the process of fusion, the energy supplied as heat is used up in changing the state by overcoming the forces of attraction between the particles. The temperature of the system does not change. Thus, heat energy supplied during the fusion gets hidden into the system. This heat energy is called latent heat of fusion.
- **Liquid to gas:**
When the energy supplied as heat overcomes the intermolecular forces of attraction between the liquid particles, the particles escape from the liquid. This is the stage when the liquid boils and converts into the gas.
- **Boiling point:** The temperature at which a liquid boils to convert into a gas at atmospheric pressure is called boiling point.
- **Vaporisation:** The change of liquid state into gaseous state at boiling point is called vaporisation.
- **Latent heat of vaporisation:** The heat energy supplied during the vaporisation is called latent heat of vaporisation.
- **Sublimation:** A change in which some solids are directly converted to gaseous state and vice versa without changing into liquid state is called sublimation.
- **Pressure and change in physical state:**
When a gas enclosed in a cylinder is compressed under pressure, the gaseous particles come closer i.e., the intermolecular distance between gaseous particles decreases. Thus, gases can be liquefied by increasing pressure and reducing temperature.

- **Dry ice:**
Solid carbon dioxide (CO_2) is called dry ice. At atmospheric pressure (1 atm), solid CO_2 gets converted directly to gaseous state without changing into liquid state.

- **Note:**
 - i. The SI unit of temperature is Kelvin (K). $0^\circ\text{C} = 273.15\text{ K}$ or $0^\circ\text{C} = 273\text{ K}$.
eg. The melting point of ice is 273 K or 0°C and the boiling point of water is 373 K or 100°C .
 - ii. The atmospheric pressure at sea level is 1 atmosphere (1 atm). Another unit of pressure is pascal (Pa). $1\text{ atm} = 1.01 \times 10^5\text{ Pa}$.

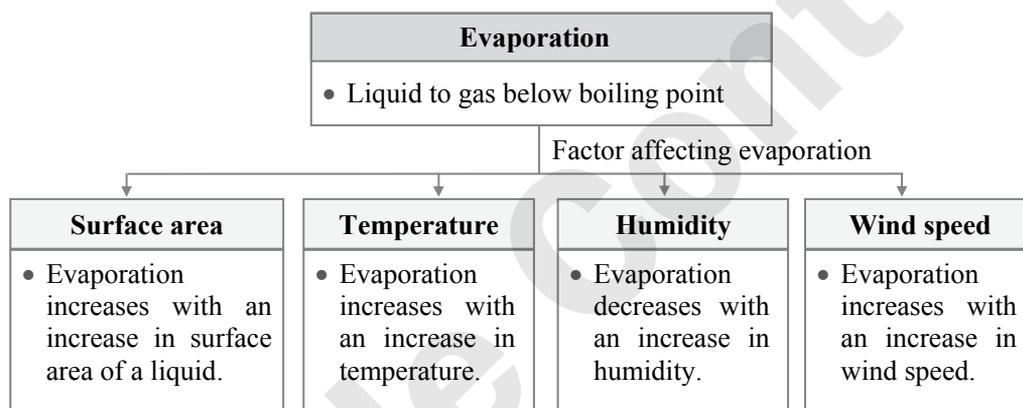
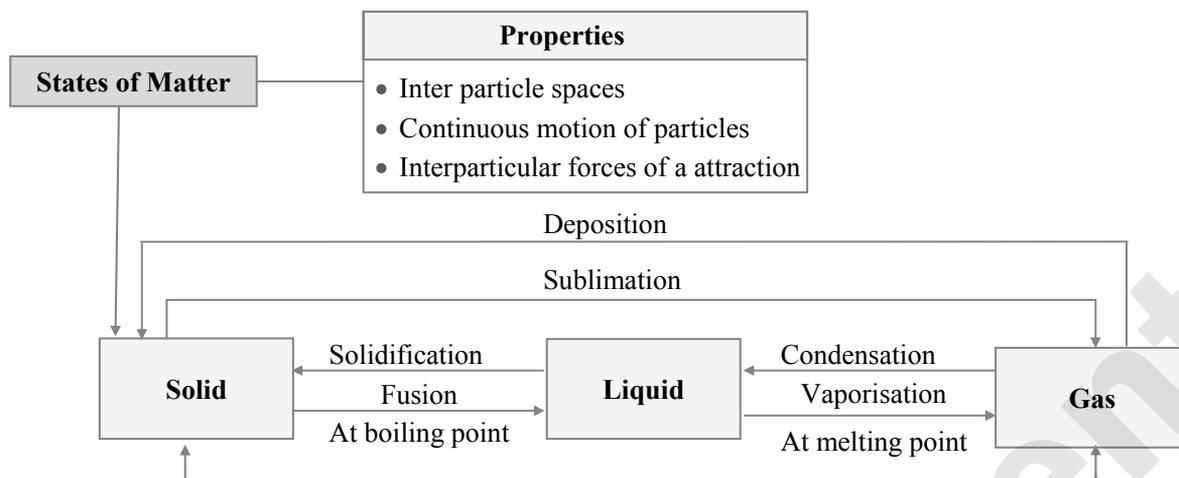
1.5 Evaporation

Evaporation is the surface phenomenon in which a liquid changes into vapour at any temperature below its boiling point.

- **Factors affecting evaporation:** The rate of evaporation increases with an increase in the surface area of a liquid, an increase in temperature of a liquid, a decrease in humidity, and an increase in wind speed.
 - **Evaporation and Cooling:**
During evaporation, the high energetic particles of a liquid are escaped in the air. Therefore, the particles of liquid absorb energy from the surroundings to compensate the energy lost during evaporation. As a result, the surroundings get cooler.
- Examples;**
- i. When we pour small amount of acetone in our palm, the particles of acetone gain energy from our palm or surroundings to compensate the energy lost in evaporation. This causes the palm to feel cool.
 - ii. In summer, people sprinkle water on roof or open ground. This is because water molecules absorb heat from the surroundings and evaporate. This helps to cool the surroundings.
 - iii. In summer, we prefer to wear cotton clothes. This is because cotton clothes readily absorb the sweat of perspiration. Some particles of sweat escape in air. As a result, the liquid particles of sweat absorb heat from the body causing the body to feel cool.
 - iv. We observe deposition of water droplets on the outer surface of a glass containing ice-cold water. When the particles of water vapour present in air come in contact with cold glass surface, they loss energy and convert into a liquid.



Quick Review



Competency Based Questions

1.0 Introduction

Multiple Choice Questions

- Everything in this universe is made up of material which scientists have named “matter”. Which of the following is NOT matter?
(A) Anger (B) Food
(C) Stone (D) Air
- Early Indian philosophers classified matter as “*Panch Tatva*”, as shown in the image. According to them, _____.



- every living thing was made up of these five basic elements
- every nonliving thing was made up of these five basic elements
- everything, living or nonliving, was made up of these five basic elements
- every living and nonliving thing was made up of at least one of those five elements

1.1 Physical Nature of Matter

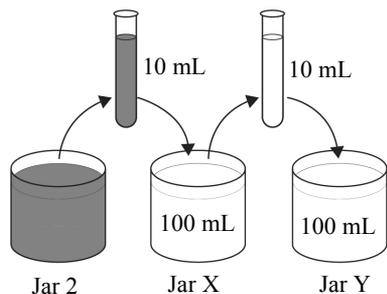
Multiple Choice Questions

- When we dissolve sugar in water, sugar particles disappear and spread throughout water. This proves that _____.
(A) matter is made of particles
(B) matter has a continuous form
(C) matter has both particulate and continuous forms
(D) none of these





2. Masood took 10 mL of the coloured water from Jar 2 and poured it into 100 mL of plain water in Jar X. He then took 10 mL of the mixture from Jar X and poured it into 100 mL of plain water in Jar Y.



What would be the likely colour of the liquids in Jar X and Jar Y respectively?

	Colour of liquid in Jar X	Colour of liquid in Jar Y
(A)		
(B)		
(C)		
(D)		

Assertion & Reason

For question numbers 3 and 4, two statements are given - one labelled Assertion (A) and the other labelled Reason (R). Select the correct answers to these questions from the codes (A), (B), (C) and (D) as given below:

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
 (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
 (C) Assertion (A) is true, but Reason (R) is false.
 (D) Assertion (A) is false, but Reason (R) is true.
3. **Assertion (A):** A sugar cube when made into powdered form contains many tiny particles.
Reason (R): Matter is divisible as it is made up of many tiny particles.

4. **Assertion (A):** Just a few crystals of potassium permanganate can colour a large volume of water.
Reason (R): There must be millions of tiny particles in just one crystal of potassium permanganate.

Case/ Source Based Questions

5. Read the information given below and answer questions based on it.

For a long time, two schools of thought prevailed regarding the nature of matter. One though believed matter to be continuous like a block of wood.



While, the other thought that matter was made up of particles like sand.



However, the idea that matter is made up of particles explains the various properties of matter.

- What happens when we dissolve sugar in water?
- If matter were to be continuous, would sugar block dissolve in water?
- The image shows repeated dilution of potassium permanganate solution. Why does colour fade on repeated dilution? What can we conclude from this?



OR

- Show by an activity using Dettol solution that the matter is made of small particles.

1.2 Characteristics of Particles of Matter

Multiple Choice Questions

1. Particles of matter possess what we call the kinetic energy. As the temperature increases,



- (A) particles move faster
 (B) kinetic energy of the particles also increases.
 (C) Both (A) and (B)
 (D) nether (A) not (B)



2. The particles of matter are very small. They are small beyond our imagination! Which of the following is/are CORRECT statement(s) with respect to particles of matter?
- (A) They are continuously moving.
 - (B) They intermix on their own with each other.
 - (C) They have force acting between them.
 - (D) All of these

Assertion & Reason

For question numbers 3 and 4, two statements are given - one labelled Assertion (A) and the other labelled Reason (R). Select the correct answers to these questions from the codes (A), (B), (C) and (D) as given below:

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
 - (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
 - (C) Assertion (A) is true, but Reason (R) is false.
 - (D) Assertion (A) is false, but Reason (R) is true.
3. **Assertion (A):** Chocolate milkshake cannot be made by mixing choco syrup with milk.
Reason (R): Particles of matter have space between them and thus, particles of choco syrup get into the spaces between milk particles.
4. **Assertion (A):** Baking soda dissolves faster in boiling water than in cold water.
Reason (R): On increasing the temperature, particles of the matter move faster. Hence, the process of dissolution becomes faster.

Case/ Source Based Questions

5. Read the following paragraph and answer the questions based on it.

Bromine is reddish-brown liquid at room temperature. It evaporates readily into a red vapour.



A gas jar is placed over bromine containing bottle which is loosely tightened with cap. It is observed that after some time, the gas jar containing air also becomes completely reddish brown.

- i. Explain why this happens.
- ii. Name the process involved.

- iii. Why are particles of matter continuously moving? State two characteristics of particles of matter.

OR

- iii. Explain: The smell of hot sizzling food reaches you several metres away, but to get the smell from cold food you have to go close.



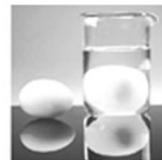
6. Read the following paragraph and answer the questions that follow on the basis of information provided and studied concept.

The gases from the atmosphere diffuse and dissolve in water. These gases, especially oxygen and carbon dioxide, are essential for the survival of aquatic animals and plants.

All living creatures need to breathe for survival. The aquatic animals can breathe under water due to dissolved oxygen in water.



- i. Why do gases diffuse in water?
- ii. When egg with its shell removed is placed in pure water, it swells. Name the phenomenon involved.
- iii. We get the smell of perfume sitting several meters away. Explain.



OR

- iii. Which of the following will diffuse faster in water? Why?
Honey, red ink

1.3 States of Matter

Multiple Choice Questions

1. The picture shows the arrangement of particles in three different substances.



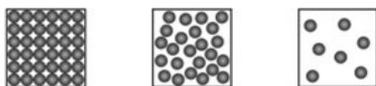
Which of the following is true about the state of the three substances?

Select the correct row.

	Substance 1	Substance 2	Substance 3
(A)	Solid	Liquid	Gas
(B)	Gas	Liquid	Solid
(C)	Liquid	Gas	Solid
(D)	Gas	Solid	Liquid



2. Particles of matter have force acting between them. This force keeps the particles together. The strength of this force of attraction varies from one kind of matter to another. Which of the following is(are) CORRECT match(es)?
- (A) Solid: Particles are held tightly in perfect order.
- (B) Liquid: Particles are close to each other but can move around within the liquid.
- (C) Gas: Particles are far apart as compared to that of solid and liquid.
- (D) All of these
3. The states of matter (solid, liquid, gas) arise due to the variation in the characteristics of the particles of matter.



Which of the following is not the property of a solid?

- (A) Fixed volume
- (B) Fixed boundary
- (C) Non-rigid
- (D) Negligible compressibility
4. The property to flow is unique to fluids. Which one of the following statements is correct?
- (A) Only gases behave like fluids
- (B) Gases and solids behave like fluids
- (C) Gases and liquids behave like fluids
- (D) Only liquids are fluids
5. A few substances are arranged in the increasing order of 'forces of attraction' between their particles. Which one of the following represents a correct arrangement?
- (A) Water, air, wind
- (B) Air, sugar, oil
- (C) Oxygen, water, sugar
- (D) Salt, juice, air
6. In which of the following conditions, the distance between the molecules of hydrogen gas would increase?
- Increasing pressure on hydrogen contained in a closed container
 - Some hydrogen gas leaking out of the container
 - Increasing the volume of the container of hydrogen gas
 - Adding more hydrogen gas to the container without increasing the volume of the container
- (A) i and iii (B) i and iv
- (C) ii and iii (D) ii and iv

Assertion & Reason

7. **Assertion (A):** Liquids can be stored in containers of different shapes.
Reason (R): Liquids have definite shape
- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

Case/ Source Based Questions

8. Read the following paragraph and answer the questions that follow on the basis of information provided and studied concept.
- Masood wanted to find out which state of a substance dissolves faster in water. He filled two similar glass jars with the same amount of water. Masood added the following substances to the jars of water.
- 10 g of copper sulphate crystal to Jar 1.
- 10 mL of 75% copper sulphate solution to Jar 2.
- The table below shows the colour of the water in each jar after specific time periods.

Jar	Colour of water in the jars		
	After 5 minutes	After 30 minutes	After 60 minutes
Jar 1			
Jar 2			

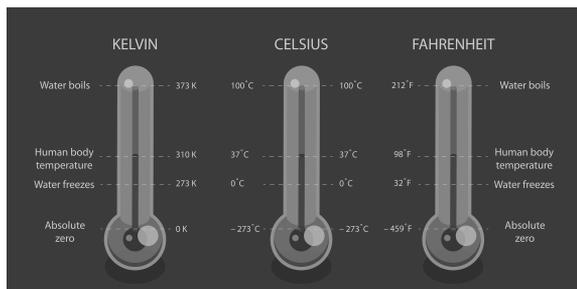
- What can be concluded from Masood's activity?
- Why did Masood use the same amount of water in each jar?
- Liquids generally have lower density as compared to solids. But you must have observed that ice floats on water. 
 Why does ice float on water?
 OR
- Water at room temperature is a liquid. Give reason.



1.4 Can Matter Change its State?

Multiple Choice Questions

1. Kelvin is the SI unit of temperature.



On converting 25 °C, 38 °C and 66 °C to Kelvin scale, the correct sequence of temperature will be

- (A) 298 K, 311 K and 339 K
 (B) 298 K, 300 K and 338 K
 (C) 273 K, 278 K and 543 K
 (D) 298 K, 310 K and 338 K
2. The boiling points of diethyl ether, acetone and n-butyl alcohol are 35 °C, 56 °C and 118 °C respectively. Which one of the following correctly represents their boiling points in Kelvin scale?
- (A) 306 K, 329 K, 391 K
 (B) 308 K, 329 K, 392 K
 (C) 308 K, 329 K, 391 K
 (D) 329 K, 392 K, 308 K
3. Choose the correct statement of the following.
- (A) Conversion of solid into vapours without passing through the liquid state is called sublimation.
 (B) Conversion of vapours into solid without passing through the liquid state is called vapourisation.
 (C) conversion of vapours into solid without passing through the liquid state is called freezing.
 (D) conversion of solid into liquid is called sublimation.
4. Some solid substances directly changes to gases without changing into liquid state. Which of the following does not undergo sublimation?



- (A) Acetone
 (B) Naphthalene
 (C) Camphor
 (D) Dry ice

5. The pressure of air in atmosphere is called atmospheric pressure. The pressure of an air in atmosphere at sea level is _____.
- (A) 1.01×10^5 Pa
 (B) 1 Pa
 (C) 1.01×10^{-5} atm
 (D) 1000 atm

6. Seema visited a Natural Gas Compressing Unit and found that the gas can be liquefied under specific conditions of temperature and pressure. While sharing her experience with friends she got confused. Help her to identify the correct set of conditions
- (A) Low temperature, low pressure
 (B) High temperature, low pressure
 (C) Low temperature, high pressure
 (D) High temperature, high pressure

Assertion & Reason

7. **Assertion (A):** Gases can be liquefied by applying pressure and reducing temperature.
Reason (R): On applying pressure, distance between the gas molecules increases while reducing the temperature imparts energy to the gas molecules.
- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
 (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
 (C) Assertion (A) is true, but Reason (R) is false.
 (D) Assertion (A) is false, but Reason (R) is true.

Case/ Source Based Questions

8. Read the following paragraph and answer questions based on it.

When we supply heat energy to ice, particles start vibrating with greater speed.



At a certain temperature, a point is reached when the energy supplied as heat overcomes the forces of attraction between the particles. The particles leave their fixed position and start moving freely. Thus, ice melts. The temperature will remain constant till all the ice is melt.

- i. Why does temperature remains constant during the process of melting of ice?
- ii. What is the melting point of water in each Celcius and Kelvin unit?



iii. Particles in water at 0 °C have higher energy than the particles of ice. Why?

OR

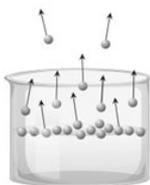
iii. Particles in steam at 100 °C have higher energy than the particles of water. Why?

1.5 Evaporation

Multiple Choice Questions

1. Which condition out of the following will increase the evaporation of water?
- Increase in temperature of water
 - Decrease in temperature of water
 - Less exposed surface area of water
 - Adding common salt to water

2. The phenomenon of change of a liquid into vapours at any temperature below its boiling point is called evaporation. The evaporation is a bulk phenomenon.

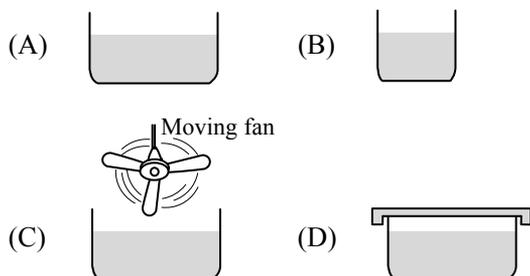


Which of the following will increase the rate of evaporation?

- Decrease in surface area of water
 - Decrease in the temperature of surroundings
 - Increase in humidity
 - Increase in wind speed
3. During summer, water kept in an earthen pot becomes cool because of the phenomenon of
- diffusion
 - transpiration
 - osmosis
 - evaporation

4. Which one of the following sets of phenomena would increase on raising the temperature?
- Diffusion, evaporation, compression of gases
 - Evaporation, compression of gases, solubility
 - Evaporation, diffusion, expansion of gases
 - Evaporation, solubility, diffusion, compression of gases

5. Look at figures below and identify in which of the vessels A, B, C or D the rate of evaporation will be the highest?



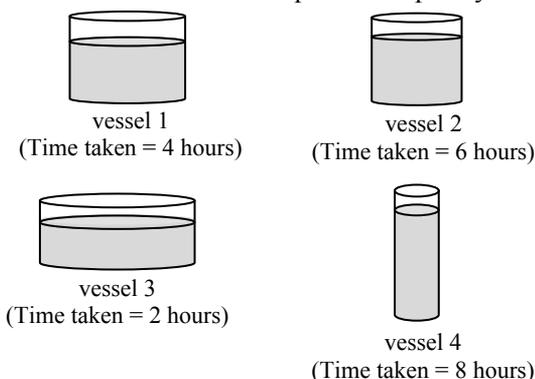
Assertion & Reason

For question numbers 6 & 7, two statements are given - one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to this question from the codes (A), (B), (C) and (D) as given below:

- Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
 - Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
 - Assertion (A) is true, but Reason (R) is false.
 - Assertion (A) is false, but Reason (R) is true.
6. **Assertion (A):** Evaporation is the surface phenomenon.
Reason (R): In evaporation, liquid changes into vapour at any temperature below its boiling point
7. **Assertion (A):** During evaporation, the surroundings get cooler.
Reason (R): The particles of liquid absorb energy from the surroundings to compensate the energy lost during evaporation.

Case/ Source Based Questions

8. Read the information given below and answer questions based on it.
 Madhu poured 100 mL of water to each of four different glass vessels. She kept all the four vessels under the Sun. Madhu noted the time taken for the water in each vessel to evaporate completely.



- What questions can be answered based on the results of Madhu's activity?
 - Why did Madhu pour equal amount of water in each vessel?
 - Why does a desert cooler cool better on a hot dry day?
- OR
- iii. What type of clothes should we wear in summer? Why?

Self - Assessment Tests

Select and write one most appropriate option out of the four options given for each of the questions.

[1 Mark Each]

- Oxygen reacts with sulphur to form sulphur dioxide (SO_2) gas. It is one of the major pollutant gases and is the gas principally responsible for acid rain. The chemical formula SO_2 means that:
 - a molecule contains 1 atom of S and 2 atoms of O
 - the ratio of the mass of S to the mass of O in the molecule is 2 : 1
 - a molecule contains 2 atoms of S and 1 atom of O
 - the ratio of the mass of S to the mass of O in the molecule is 1 : 2
- A patient is diagnosed with a rare genetic disorder that results in defective lysosomes. What symptoms might this patient experience?
 - Fatigue and muscle weakness
 - Respiratory distress and coughing
 - Vision impairment and blindness
 - Abnormal accumulation of waste material in cells
- Which of the following is NOT a type of connective tissue?
 - Adipose tissue
 - Cartilage tissue
 - Epithelial tissue
 - Blood tissue
- A fishing company wants to increase its catch of mackerel in the open sea. Which technology should they use?
 - Satellites and echo-sounders
 - Fishing nets
 - Underwater cameras
 - Harpoons
- Liquids A, B, C and D have melting points 258 K, 224 K, 337 K and 298 K, respectively. Which of the following have the largest forces of attraction?
 - A
 - B
 - C
 - D
- Which of the following is a homogenous mixture?
 - Wood
 - Soil
 - Vinegar
 - Both (A) and (C)
- Hitting a ball ahead with a cricket bat involves _____ work.
 - positive
 - zero
 - negative
 - no
- The velocity of sound is greatest amongst the options given in _____.
 - copper
 - oxygen
 - steam
 - water
- Which of the following is the example of uniform motion?
 - Motion of a bird catching prey
 - Motion of fan after switch off.
 - Motion of periods of soldiers.
 - Motion of aeroplane before take off
- An archer shoots an arrow. Consider the action force to be the bow string against the arrow. The reaction force is the:
 - Arrow pushing against bow string.
 - Air resistance against the bow.
 - Weight of the arrow.
 - Grip of the Archer's hand on the bow.

Score Card		
Assess Your Accuracy		
Test - 1	Total number of correct answers	<input type="text"/> / 10

Scan the given Q.R. Code to download the Answer key and Solutions to Multiple Choice Questions (MCQs): Test - 1 in PDF format.



Select and write one most appropriate option out of the four options given for each of the questions.

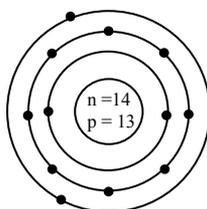
[1 Mark Each]

1. Arvind writes the formula and charge on ions of three different compounds as shown below.

Formula	PbO_2	MgCl_2	Al_2O_3
Ions	Pb^{4+} and O^{2-}	Mg^{2+} and Cl^-	Al^{3+} and O^{2-}

He now wants to write the formula of a compound formed when two ions, Pb^{4+} and Cl^- , combine. What is the correct formula of the compound formed?

- (A) Pb_3Cl (B) PbCl_2 (C) Pb_2Cl_3 (D) PbCl_4
2. Atomic number and mass number of aluminium is 13 and 27 respectively. Dinesh draws the atomic structure of an atom of aluminium as shown below. What is INCORRECT in this schematic representation?



- (A) The number of neutrons in nucleus. (B) The number of electrons in K-shell.
 (C) The number of protons in the nucleus. (D) The total number of electrons in the atom.
3. A plant cell was treated with a chemical that disrupted the membrane of an organelle. As a result, the cell was unable to carry out photosynthesis. Which organelle was most likely affected?
- (A) Nucleus (B) Chloroplast
 (C) Endoplasmic reticulum (D) Peroxisome
4. Which of the following tissues is found in the walls of blood vessels and helps regulate blood pressure?
- (A) Adipose tissue (B) Epithelial tissue
 (C) Nervous tissue (D) Smooth muscle tissue
5. A farmer wants to plant soybean and maize in the same field in a specific pattern. Which of the following methods should the farmer use?
- (A) Mixed cropping (B) Intercropping
 (C) Single cropping (D) Rotational cropping
6. Which of the following correctly describes the inter-conversion of energy?
- (A) Energy cannot be converted from one form to another.
 (B) Energy can only be converted from potential energy to kinetic energy.
 (C) Energy can be converted from one form to another, but the total amount of energy remains constant.
 (D) Energy can be converted from one form to another, and the total amount of energy can increase or decrease.
7. Match the columns.

	Animals		Frequency (in Hz) audible to them
i.	Rhinoceros	a.	80000
ii.	Moth	b.	22000
iii.	Child	c.	5

- (A) (i – c), (ii – a), (iii – b) (B) (i – a), (ii – c), (iii – b)
 (C) (i – c), (ii – b), (iii – a) (D) (i – a), (ii – b), (iii – c)

For question numbers 1 to 10, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below: [1 Mark Each]

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of the Assertion (A).
 (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
 (C) Assertion (A) is true, but Reason (R) is false.
 (D) Assertion (A) is false, but Reason (R) is true.

- Assertion (A):** Phosphorus is a tetra-atomic molecule.
Reason (R): A molecule of phosphorus consists of eight atoms of phosphorus.
- Assertion (A):** Ribosomes are responsible for protein synthesis in cells.
Reason (R): Ribosomes are composed of RNA and protein, and use genetic information from mRNA to synthesize proteins.
- Assertion (A):** The structure of tissues is closely related to their function.
Reason (R): Tissues are made up of specialized cells that work together to perform specific functions in the body.
- Assertion (A):** Tube wells are more efficient than dug wells for irrigation.
Reason (R): Tube wells can tap water from deeper strata, which dug wells cannot.
- Assertion (A):** The work done by a force can be negative.
Reason (R): The work done will be equal to the product of the force and displacement.
- Assertion (A):** With decrease in time period, frequency increases.
Reason (R): Time period and frequency are inversely proportional.
- Assertion:** We can smell liquid perfume only when we bring perfume bottle near to nose. However, if the same perfume is sprayed, we can smell its fragrance even from a distance.
Reason: Rate of diffusion of gases is higher than that of liquids
- Assertion (A):** Water drops are removed from wet clothes by giving light jerk to the cloth.
Reason (R): Water drops have inertia of motion.
- Assertion (A):** Pressure exerted on ground is more when a person is walking than when the person is standing.
Reason (R): The pressure varies directly with the force and surface area of contact.
- Assertion (A):** When the displacement of the body is directly proportional to square of the time taken, then the body is moving with uniform acceleration.
Reason (R): The slope of distance-time graph with time axis gives the value of instantaneous velocity.

Score Card		
Assess Your Accuracy		
Test - 1	Total number of correct answers	<input type="text"/> / 10

Scan the given Q.R. Code to download the Answer key and Solutions to Assertion & Reason: Test - 1 in PDF format.



For question numbers 1 to 10, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below: [1 Mark Each]

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

1. **Assertion (A):** Dysfunction of mitochondria can lead to energy deficiency in cells.
Reason (R): Mitochondria are responsible for producing ATP, the primary energy currency of cells.
2. **Assertion (A):** Muscle tissue is responsible for movement in the body.
Reason (R): Muscle tissue is composed of cells that can contract and relax to produce movement.
3. **Assertion (A):** Developing crop varieties with higher yield is important for improving productivity.
Reason (R): Higher yielding varieties produce more crop per acre, which can help to increase the overall productivity of a crop.
4. **Assertion (A):** A more powerful vehicle would complete a journey in a shorter time than a less powerful one.
Reason (R): Power measures the speed of work done, that is, how fast or slow work is done.
5. **Assertion (A):** In sound propagation, it is the energy of the sound that travels and not the particles of the medium.
Reason (R): The change in density from one maximum value to the minimum value makes one complete oscillation.
6. **Assertion (A):** Suspensions are heterogeneous mixtures.
Reason (R): The particles of a suspension scatter a beam of light.
7. **Assertion (A):** A player is catching a ball. In this case, if the action force is the impact of the ball against the player's glove, then the reaction force is grip of the player on the ball.
Reason (R): Action and reaction forces act on the different objects.
8. **Assertion (A):** Vicky was sitting in a roller-coaster ride. While coming down suddenly from top of the ride, he felt a strong pull causing him to leave his seat for a moment.
Reason (R): Acceleration is the rate of change of velocity which in turn becomes the sole reason for the force experienced by the body.
9. **Assertion (A):** To verify Newton’s first law of motion, balloon with the wooden disc is placed on smooth glass sheet.
Reason (R): The smooth glass sheet offers very less inertia.
10. **Assertion (A):** A stone and a feather dropped from same height experience same acceleration in absence of air resistance.
Reason (R): Acceleration due to gravity is inversely proportional to the mass of the body.

Score Card		
Assess Your Accuracy		
Test - 2	Total number of correct answers	<div style="border: 1px dashed black; width: 60px; height: 20px; display: inline-block;"></div> / 10

Scan the given Q.R. Code to download the Answer key and Solutions to Assertion & Reason: Test - 2 in PDF format.



Question numbers 1 to 5 are case/ Source based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts. [4 Marks Each]

1. Read the following paragraph and answer the questions:

To verify the law of conservation of mass in a chemical reaction, a student carried out the following reaction under the guidance of her teacher.

Calcium oxide + Water \rightarrow Calcium hydroxide

(56 g) (18 g) (x g)

[Given: Atomic mass: Ca = 40 u, O = 16 u, H = 1 u]

- In the above reaction, find the mass of calcium hydroxide formed.
- Which postulate of Dalton's atomic theory is the result of the law of conservation of mass?
- Find the ratio by mass of the combining elements in the following compounds:
 - CaO
 - Ca(OH)₂

OR

- If calcium hydroxide is made through a different reaction, will the mass ratio of calcium, oxygen and hydrogen remain the same? Which law of chemical combination will govern your answer? Explain.

2. Read the following paragraph and answer the questions.

In this experimental case study, we investigated the role of lysosomes, a type of cell organelle, in the degradation of cellular waste. To test this, we used two different types of cells: one group had functional lysosomes while the other group had lysosomes inhibited using a drug called chloroquine.

We then introduced a fluorescent dye into both groups of cells, which was taken up by the cells and broken down by the lysosomes. We measured the amount of fluorescence over time using a fluorescence microscope.

The results showed that cells with functional lysosomes had a gradual decrease in fluorescence over time, indicating that the fluorescent dye was being broken down by the lysosomes. In contrast, cells with inhibited lysosomes had a much slower decrease in fluorescence, suggesting that the dye was not being effectively broken down.

These findings support the idea that lysosomes play a crucial role in the degradation of cellular waste. Without functional lysosomes, cells are unable to efficiently break down and dispose of waste materials, leading to the accumulation of harmful substances within the cell. This study highlights the importance of lysosomes in maintaining proper cellular function and provides insight into potential treatments for lysosomal storage disorders, which result from lysosomal dysfunction.

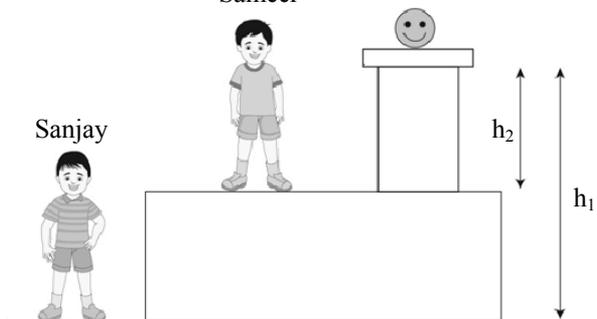
- What are lysosomes?
- What are the functions of lysosomes?
- What was the purpose of introducing the fluorescent dye into both groups of cells?

OR

- What is the main implication of this study for lysosomal storage disorders?

3. Study the case given below and answer the questions on the basis of your understanding of the case and the related studied concepts.

Sameer



Question numbers 1 to 5 are case/ source based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts. [4 Marks Each]

1. Read the following and answer the questions on the basis of your understanding of the given information and the related studied concepts.

While studying the atomic structure of atoms, a scientist reported the composition of atoms of four different elements W, X, Y and Z as given in the below table:

Element	No. of protons	No. of electrons	No. of neutrons
W	4	4	5
X	9	9	10
Y	13	13	14
Z	16	16	16

- What is the number of valence electrons in element Y?
- If the mass number of element Y is 'y' and the mass number of element W is 'w', then what will be the value of 'y - w'?
- What is the electronic configuration of element X?
Represent diagrammatically the composition of the nucleus and distribution of electrons in the atom of element X.

OR

- From the above four elements, the scientist wants to choose two elements having same valency. Which pair of elements should he select? Explain your answer.

2. Read the following and answer the questions on the basis of your understanding of the given information and the related studied concepts.

Introduction: Irrigation is an essential aspect of agriculture that helps to provide water to crops in arid or semi-arid regions. Different irrigation systems such as wells, canals, river lift systems, and tanks are utilized in agriculture to provide water to crops. In this case study, we will examine an experiment that compares the effectiveness of different irrigation systems in crop production.

Experiment: The experiment was conducted in a region with low rainfall, and the crop chosen for the study was maize. Four different irrigation systems were utilized, including wells, canals, river lift systems, and tanks. The experiment was carried out for three seasons, and the yield was recorded for each system.

Results: The results of the experiment indicated that the highest yield was obtained from the river lift system, followed by tanks, canals, and wells, respectively. The river lift system provided the most consistent water supply, followed by tanks, while canals and wells experienced intermittent water supply due to factors such as drought, maintenance issues, and water theft.

- What is the most extensive irrigation system in India?
- Which type of well taps water from the deeper strata?
- Which initiative involves building small check-dams to increase ground water levels?
 - What is the purpose of tanks in irrigation?

OR

- What does the experiment highlights?
 - What can you conclude from the experiment?

3. Study the case given below and answer the questions on the basis of your understanding of the case and the related studied concepts.

A group of architects was designing a new concert hall and wanted to ensure that the acoustics were optimized for the best possible sound quality. To achieve this, they studied the principles of echo and its impact on the quality of sound in the concert hall. They made adjustments to the design to reduce reverberation as well. Consequently they were able to create a concert hall with exceptional acoustics.





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