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7th Standard

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Author :

Mr. A. Murugesan, M.Sc., M.Ed., M.Phil.
Chennai

Head Office:

1620, 'J' Block, 16th Main Road,
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NOTE FROM PUBLISHER

It gives me great pride and pleasure in bringing to you **Sura's Science Guide** for **7th Standard [Term-I+II+III]**. It is prepared as per the updated Textbook.

This guide encompasses all the requirements of the students to comprehend the text and the evaluation of the textbook.

Additional questions have been provided exhaustively for clear understanding of the units under study.

In order to learn effectively, I advise students to learn the subject section-wise and practice the exercises given. It will be a teaching companion to teachers and a learning companion to students.

Though these salient features are available in this Guide, I cannot negate the indispensable role of the teachers in assisting the student to understand the subject thoroughly.

I sincerely believe this guide satisfies the needs of the students and bolsters the teaching methodologies of the teachers.

I pray the almighty to bless the students for consummate success in their examinations.

Subash Raj, B.E., M.S.
- Publisher
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TERM-I CONTENTS

Unit	Name	Page No.	Month
1.	Measurement	1 - 24	June
2.	Force and Motion	25 - 48	July
3.	Matter Around Us	49 - 70	August
4.	Atomic Structure	71 - 86	June
5.	Reproduction and Modification in Plants	87 - 102	July
6.	Health and Hygiene	103 - 117	August
7.	Visual Communication	118 - 122	August
Sura's Model Summative Assessment Term I		123 - 126	

TERM-II CONTENTS

Unit	Name	Page No.
1.	Heat and Temperature	127 - 144
2.	Electricity	145 - 162
3.	Changes Around Us	163 - 182
4.	Cell Biology	183 - 196
5.	Basis of Classification	197 - 207
6.	Digital Painting	207 - 210
Sura's Model Summative Assessment Term II		211 - 214

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TERM-III

CONTENTS

Unit	Name	Page No.	Month
1.	Light	215 - 238	January
2.	Universe and Space	239 - 250	February
3.	Polymer Chemistry	251 - 268	February
4.	Chemistry in Daily Life	269 - 280	March
5.	Animals in Daily Life	281 - 289	March
6.	Visual Communication	290 - 294	April
Sura's Model Summative Assessment Term III		295 - 298	

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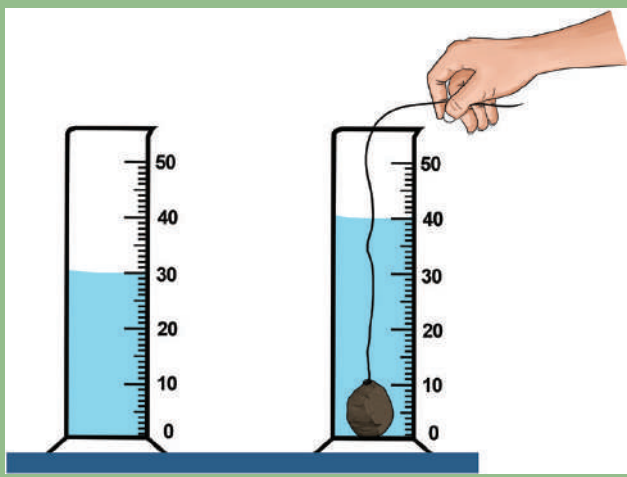

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7.	Visual Communication	118 - 122	August
Sura's Model Summative Assessment Term I		123 - 126	

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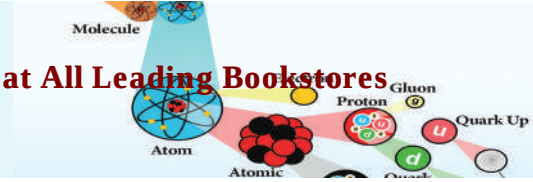
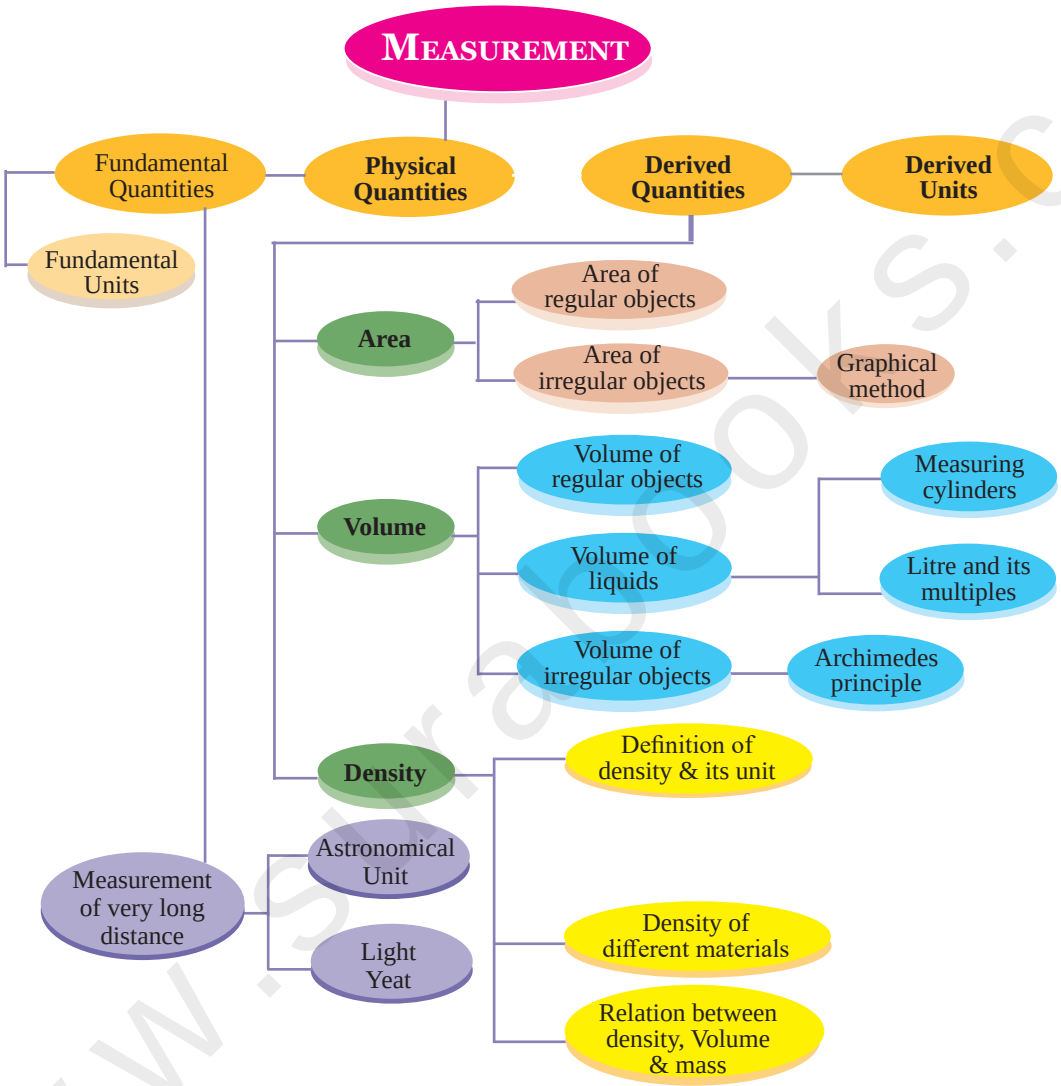


Unit 1 MEASUREMENT

CONCEPT MAP



Definitions

Physical quantity	:	A quantity that can be measured is called a physical quantity.
Measurement	:	Measurement is a process of comparing an unknown physical quantity with a known physical quantity called unit.
Unit	:	A unit is a known measure of a physical quantity with which physical quantities of the same kind are measured.

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Area	:	Area is the measure of the region inside a closed line.
Volume	:	The amount of space occupied by a three dimensional object is known as its volume.
Capacity of a container	:	The maximum volume of liquid that a container can hold is called as capacity of the container.
Density	:	Density of a substance is defined as the mass of the substance contained in unit volume (1 m^3)
Astronomical Unit	:	One astronomical unit is defined as the average distance between the earth and the sun.
Light year	:	One light year is defined as the distance traveled by light in vacuum during the period of one year.
Fundamental quantities	:	A set of physical quantities which cannot be expressed in terms of any other quantities are known as "Fundamental quantities". Their corresponding units are called "Fundamental units".
Derived quantities	:	The physical quantities which can be obtained by mathematically combining (i.e., multiplying and dividing) the fundamental quantities are known as "Derived quantities". Their corresponding units are called "Derived units".
Perihelion	:	It is the position of the shortest distance between the earth and the sun.
Aphelion	:	It is the position of the largest distance between the earth and the sun.

Formulae to Remember

S. No	Dimension		Formula	Unit
1.	Area of rectangle	=	$l \times b$	m^2
2.	Area of square	=	$s \times s$	m^2
3.	Area of circle	=	$\pi \times r^2$	m^2
4.	Triangle	=	$\frac{1}{2} \times b \times h$	m^2
5.	Volume	=	$l \times b \times h$	m^3
6.	Speed	=	distance/time	m/s
7.	Electric charge	=	electric current × time	Coulomb (C)
8.	Density	=	Mass/Volume	Kg/m^3
9.	Mass	=	Density × Volume	kg
10.	Volume	=	mass/density	m^3
11.	Volume of cube	=	$a \times a \times a$	m^3

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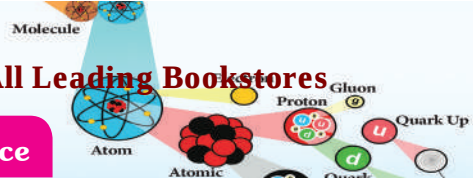

12.	Volume of cuboid	=	$l \times b \times h$	m^3
13.	Volume of sphere	=	$\frac{4}{3} \times \pi \times r^3$	m^3
14.	Cylinder	=	$\pi \times r^2 \times h$	m^3
15.	Light year	= = =	Speed of light in vacuum × time 3×10^8 m/s × 365 × 24 × 60 × 60 9.46×10^{15}m	
16.	Astronomical unit	= =	Average distance between the earth and the sun 1.496×10^{11} m	

Evaluation

I. Choose the best answer.

1. Which of the following is a derived unit?

(a) mass (b) time (c) area (d) length

Ans (c) area

2. Which of the following is correct?

(a) 1L = 1 cc (b) 1L = 10 cc
(c) 1L = 100 cc (d) 1L = 1000 cc

Ans (d) 1L = 1000 cc

3. SI unit of density is

(a) kg/m^2 (b) kg/m^3 (c) kg/m (d) g/m^3

Ans (b) kg/m^3

4. Two spheres have mass and volume in the ratio 2:1. The ratio of their density is

(a) 1:2 (b) 2:1 (c) 4:1 (d) 1:4

Ans (b) 2:1

5. Light year is the unit of

(a) distance (b) time
(c) density (d) Both length and time

Ans (a) distance

II. Fill in the blanks:

1. Volume of irregularly shaped objects are measured using the law of _____.

Ans Archimedes

2. One cubic metre is equal to_____ cubic centimetre. **Ans 10,00,000 or 10^6**
3. Density of mercury is _____. **Ans 13,600 kg/m^3**
4. One astronomical unit is equal to _____. **Ans 1.496×10^{11}m**
5. The area of a leaf can be measured using a _____ **Ans graph sheet**

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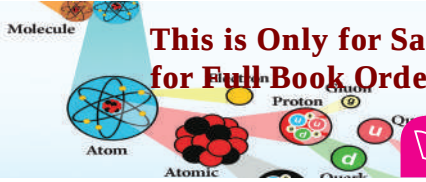

III. State true or false. If false, correct the statement.

1. The region covered by the boundary of the plane figure is called its volume.

Ans. False. Correct statement : The region covered by the boundary of plane figure is called its **area**.

2. Volume of liquids can be found using measuring containers.

Ans. True

3. Water is denser than kerosene.

Ans. True

4. A ball of iron floats in mercury.

Ans. True

5. A substance which contains less number of molecules per unit volume is said to be denser.

Ans. False. Correct statement : A substance which contains **more** number of molecules per unit volume is said to be denser.

IV. Match the following items.

a.

i.	Area	(a)	light year
ii.	Distance	(b)	m^3
iii.	Density	(c)	m^2
iv.	Volume	(d)	kg
v.	Mass	(e)	kg / m^3

Ans i-c, ii-a, iii-e, iv- b, v - d

b.

i.	Area	(a)	g / cm^3
ii.	Length	(b)	measuring jar
iii.	Density	(c)	amount of a substance
iv.	Volume	(d)	rope
v.	Mass	(e)	plane figures

Ans i-e, ii-d, iii-a, iv- b, v - c

V. Arrange the following in correct sequence :

1. 1 L, 100 cc, 10 L, 10 cc

Ans. 10 cc, 100 cc, 1 L, 10 L

2. Copper, Aluminium, Gold, Iron

Ans. Aluminium, Iron, Copper, Gold

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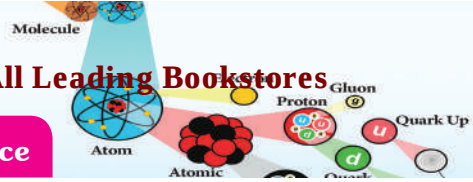

VI. Use the analogy to fill in the blank:

1. Area: M^2 :: Volume : _____ **Ans** M^3
2. Liquid : Litre :: Solid : _____ **Ans** cm^3
3. Water : Kerosene :: _____ :Aluminium **Ans** Iron

VII. Consider the following statements and choose the correct option.

(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true, but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false
(d) Assertion is false but reason is true.

1. **Assertion (A) : Volume of a stone is found using a measuring cylinder.**
   Reason (R) : Stone is an irregularly shaped object.
   Ans (a) Both assertion and reason are true and reason is the correct explanation of assertion
2. **Assertion (A) : Wood floats in water.**
   Reason (R) : Water is a transparent liquid.
   Ans (b) Both assertion and reason are true, but reason is not the correct explanation of assertion
   Correct explanation: Density of water is more than the density of wood.
3. **Assertion (A) : Iron ball sinks in water.**
   Reason (R) : Water is denser than iron.
   Ans (b) Both assertion and reason are true, but reason is not the correct explanation of assertion
   Correct explanation : Density of iron is more than that of water.

VIII. Answer very briefly.

1. **Name some of the derived quantities.**

Ans. Area, volume, density.

2. **Give the value of one light year.**

Ans. One light year = 9.46×10^{15}m

3. **Write down the formula used to find the volume of a cylinder.**

Ans. Volume of a cylinder = $\pi r^2 h$

4. **Give the formula to find the density of objects.**

Ans. Density (D) $= \frac{\text{mass}(m)}{\text{volume}(v)}$

$$D = \frac{(m)}{(v)}$$

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5. Name the liquid in which iron ball sinks.

Ans. Iron ball sinks in water. The density of an iron ball is more than that of water so it sinks in water.

6. Name the units used to measure the distance between celestial objects.

Ans. Astronomical unit and light year are the units used to measure the distance between celestial objects.

7. What is the density of gold?

Ans. Density of gold is 19,300 kg/m^3.

IX. Answer briefly.

1. What are derived quantities?

Ans. The physical quantities which can be obtained by multiplying, dividing or by mathematically combining the fundamental quantities are known as derived quantities.

(or)

The physical quantities which are expressed is terms of fundamental quantities are called derived quantities.

2. Distinguish between the volume of liquid and capacity of a container.

Ans.

S.No	Volume of liquid	Capacity of a container
1.	Volume is the amount of space taken up by a liquid	Capacity is the measure of an objects ability to hold a substance like solid, liquid or gas
2.	It is measured in cubic units.	It is measured in litres, gallons, pounds, etc.
3.	It is calculated by multiplying the length, width and height of an object.	It's measurement is cc or ml.

3. Define the density of objects.

Ans. Density of a substance is defined as the mass of the substance contained in unit volume.

$$\text{Density (D)} = \frac{\text{mass}(m)}{\text{volume}(v)}$$

4. What is one light year?

Ans. One light year is the distance travelled by light in vacuum during the period of one year.

1 Light year = 9.46×10^{15}m.

5. Define - Astronomical unit?

Ans. One astronomical unit is defined as the average distance between the earth and the sun.

1AU = 1.496 5 10^6km = 1.496×10^{11}m.

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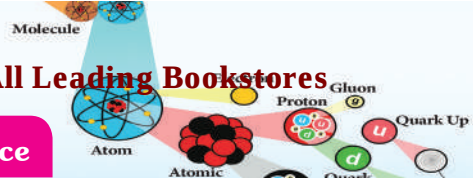


X. Answer in detail.

1. Describe the graphical method to find the area of an irregularly shaped plane figure.

Ans. To find the area of an irregularly shaped plane figure, we have to use graph paper.

(i) Place a piece of paper with an irregular shape on a graph paper and draw its outline.

(ii) To find the area enclosed by the outline, count the number of squares inside it (M).

(iii) You will find that some squares lie partially inside the outline.

(iv) Count a square only if half (p) or more of it (N) lies inside the outline.

(v) Finally count the number of squares, that are less than half. Let it be Q.

For the shape in figure we have the following:

M = 50 N = 7

P = 4 Q = 4

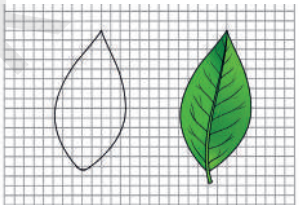
Now, the approximate area of the can be calculated using the following formula.

$$\text{Area of the leaf} = M + \left(\frac{3}{4}\right)N + \left(\frac{1}{2}\right)P + \left(\frac{1}{4}\right)Q \text{ sq. cm}$$

$$= 50 + \frac{3}{4} \times 7 + \frac{1}{\cancel{2}} \times \cancel{4}^{2} + \frac{1}{\cancel{4}} \times \cancel{4}$$

$$= 50 + \frac{21}{4} + 2$$

$$= 52 + 5.25 = 58.25 \text{ sq.mm} = 0.5825 \text{ sq.cm}$$



Area of an irregularly shaped plane figure

2. How will you determine the density of a stone using a measuring jar?

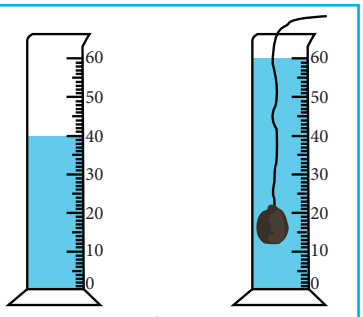
Ans. Determination of density of a stone using a measuring cylinder.

(i) In order to determine the density of a solid, we must know the mass and volume of the stone.

(ii) The mass of the stone is determined by a physical balance very accurately. Let it be 'm' grams.

(iii) In order to find the volume, take a measuring cylinder and pour in it some water.

(iv) Record the volume of water from the graduations marked on measuring cylinder. Let it be 40 cm^3.



Density of a stone using measuring cylinder.

(v) Now tie the given stone to a fine thread and lower it gently in the measuring cylinder, such that it is completely immersed in water.

(vi) Record the new level of water. Let it be 60 cm^3.

$\therefore$ Volume of the solid = $(60 - 40)\ cm^3$

= $20\ cm^3 = V\ cm^3$ (assume)

Knowing the mass and the volume of the stone, the density can be calculate by the formula :

$$\text{Density} = \frac{\text{mass}}{\text{volume}} = \frac{m}{v}\ g/cm^3$$

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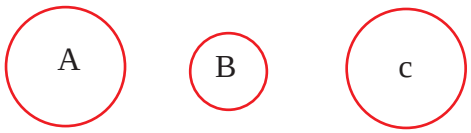
XI. Questions based on Higher Order Thinking Skills:

1. There are three spheres A, B, C as shown below :

Sphere A and B are made of same material. Sphere C is made of a different material. Spheres A and C have equal radii. The radius of sphere B is half that of A. Density of A is double that of C.



Now answer the following questions:

i. Find the ratio of masses of spheres A and B.

ii. Find the ratio of volumes of spheres A and B.

iii. Find the ratio of masses of spheres A and C.

Ans. i. Ratio of masses of spheres A and B

$$M_A : M_B$$

$$D \times V_A : D \times V_B$$ (Radius of sphere B is half that of A)

Let the mass of sphere A = M_A

Let the mass of sphere B = M_B

Mass = Density × Volume

$M_A = D_A \times V_A$

$M_B = D_B \times V_B$ (Density is same)

Volume of Sphere A = $\frac{4}{3}\pi r^3$

Volume of Sphere B = $\frac{4}{3}\pi \times \left(\frac{r_A}{2}\right)^3$

$$\cancel{D} \times \frac{4}{3}\pi r^3 : \cancel{D} \times \frac{4}{3}\pi \left(\frac{r}{2}\right)^3 = 1 : \frac{1}{8} = 8:1$$

ii. Ratio of volumes of spheres A and B

$V_A : V_B$

$\boxed{8:1}$ (As mass is directly proportional to volume)

iii. Ratio of masses of spheres A and C.

$M_A : M_C$

$2D \times V : D \times V$ [∴Density of A is double that of C]

$\boxed{2:1}$

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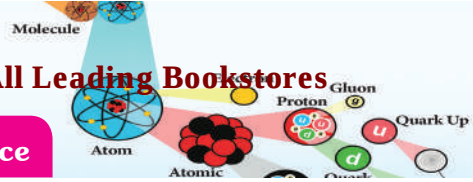

XII. Numerical problems:

1. A circular disc has a radius 10 cm. Find the area of the disc in m^2. (Use $\pi = 3.14$)

Ans. **Given** radius = 10 cm = 0.1m

π = 3.14

Area of a circular disc A = ?
(in m^2)

Formula : Area of a circle A = πr^2

= 3.14 × 0.1 × 0.1

Solution : A = $0.0314 m^2$

2. The dimension of a school playground is 800 m × 500 m. Find the area of the ground.

Ans. **Given :** The dimension of a school

Playground = l × b = 800 m × 500 m

Formula : Area of the ground A = $l \times b$

= 800 × 500

= 4,00,000

Solution : A = 4,00,000 m^2

3. Two spheres of same size are made from copper and iron respectively. Find the ratio between their masses. (Density of copper 8,900 kg/m^3 and iron 7,800 kg/m^3).

Ans. **Given :** Density Copper D_C = 8900 kg/m^3

Density of Iron D_I = 7800 kg/m^3

Volume of Copper sphere = Volume of Iron sphere

To find : Ratio of Masses of Copper (M_C) and Iron (M_I)

Solution: Mass = Density × Volume

$M_C = D_C \times V$, $M_I = D_I \times V$

M_C = 8900 V, M_I = 7,800 V

$M_C = M_I$

8900 V : 7800 V

= 1.14 : 1

4. A liquid having a mass of 250 g fills a space of 1000 cc. Find the density of the liquid.

Ans. **Given :** Mass of a liquid M = 250g

Volume V = 1000cc

Density of the liquid D = ?

Formula: Density D = $\frac{\text{mass}(m)}{\text{volume}(v)} = \frac{25\cancel{0}}{100\cancel{0}}$ = 0.25 g/cc

Solution: Density of the liquid = 0.25g/cc

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5. A sphere of radius 1cm is made from silver. If the mass of the sphere is 33g, find the density of silver (Take $\pi = 3.14$)

Ans. **Given :** radius of a sphere r = 1cm

Volume of the sphere V = ?

Mass of the sphere M = 33g

Density of silver D = ?

Formula: Density D $= \frac{\text{mass of the sphere(M)}}{\text{volume of the sphere(V)}}$

Volume (V) $= \frac{4}{3}\pi r^3 = \frac{4}{3} \times 3.14 \times 1 \times 1 \times 1 =$ 4.187 (cm^3)

$D = \frac{M}{V} = \frac{33}{4.187} = 7.889$ g/cc

Solution: Density of silver sphere = 7.889 g/cc.

XIII. Cross word puzzle:

Clues – Across

1. SI unit of temperature
2. A derived quantity
3. Mass per unit volume
4. Maximum volume of liquid a container can hold

Clues – Down

a. A derived quantity
b. SI unit of volume
c. A liquid denser than iron
d. A unit of length used to measure very long distances

Ans.

	K (1)	E	L	V (a)	I	N					
				E							
	L (d)			L		C (b)					M (c)
	I		V (2)	O	L	U	M	E			E
	G			C		B					R
	H			I		I					C
	T			T		C					U
	Y			Y		M					R
	E				D (3)	E	N	S	I	T	Y
C	A	P	A	C	I	T	Y				
	R					R					
						E					

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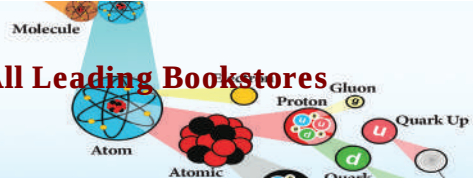


Ans: **Across**

1. KELVIN
2. VOLUME
3. DENSITY
4. CAPACITY

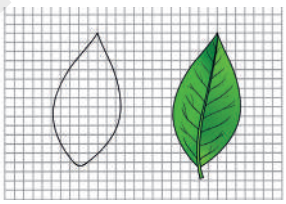
Down

a. VELOCITY
b. CUBIC METRE
c. MERCURY
d. LIGHT YEAR

Intext Activites

➝ ACTIVITY - 1

Take a leaf from any one of the trees. Place it on a graph sheet and draw the outline of the leaf with a pencil. Remove the leaf. You can see the outline of the leaf on the graph sheet.



i. Now, count the number of whole squares enclosed within the outline of the leaf. Take it as M.

ii. Then, count the number of squares that are more than half. Take it as N.

iii. Next, count the number of squares which are half of a whole square. Note it to be P.

iv. Finally, count the number of squares that are less than half. Let it be Q.

Now, the approximate area of the leaf can be calculated using the following formula.

Approximate area of the leaf = $M + \left(\frac{3}{4}\right)N + \left(\frac{1}{2}\right)P + \left(\frac{1}{4}\right)Q$ square cm.

Area of the leaf = _____ _cm^2.

Ans. M = 50 N = 7

P = 4 Q = 4

Approximate area o the leaf $= M+\left(\frac{3}{4}\right)N+\left(\frac{1}{2}\right)P+\left(\frac{1}{4}\right)Q$

$= 50+\left(\frac{3}{4}\right)\times 7+\left(\frac{1}{\cancel{2}}\times \overset{2}{\cancel{4}}\right)+\frac{1}{\cancel{4}}\times \cancel{4}$

$= 50+\frac{21}{4}+2+1= 50 + 5.25 + 2 + 1$

$= \boxed{58.25 \text{ sq. mm}} = 0.5825 \text{ sq.cm}$

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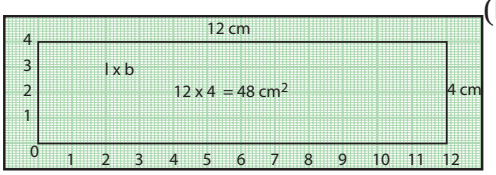
ACTIVITY - 2

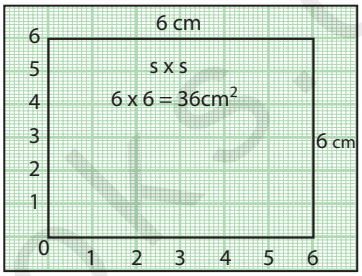
Draw the following regularly shaped figures on a graph sheet and find their area by the graphical method. Also, find their area using appropriate formula. Compare the results obtained in two methods by tabulating them.

(a) A rectangle whose length is 12 cm and breadth is 4 cm.
(b) A square whose side is 6 cm.
(c) A circle whose radius is 7 cm.
(d) A triangle whose base is 6 cm and height is 8 cm.

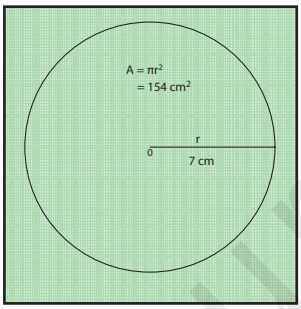
Ans. (a)



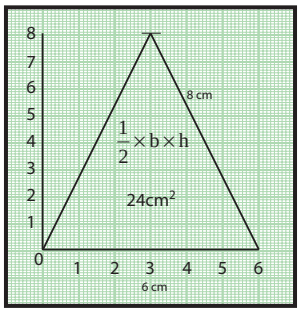
(b)



(c)



(d)



S. No	Shape	Area using formula	Area using graphical method
1.	Rectangle	$A = l \times b = 12 \times 4 = 48$sq.cm	48 sq. cm
2.	Square	$A = s \times s = 6 \times 6 = 36$ sq. cm	36 sq. cm
3.	Circle	$A = \pi r^2 = \frac{22}{\cancel{7}} \times \cancel{7} \times 7 = 154$ sq.cm	154 sq.cm
4.	Triangle	$\frac{1}{2} \times b \times h = \frac{1}{\cancel{2}} \times \cancel{6}^{3} \times 8 = 24$ sq. cm	24 sq. cm

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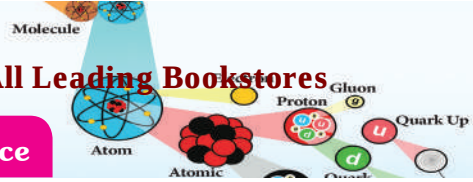
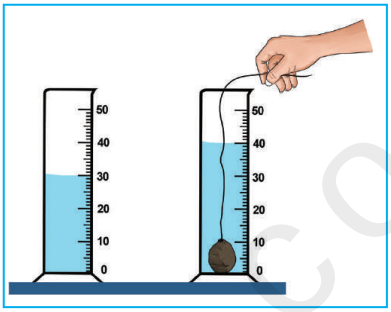


ACTIVITY - 3

Take a measuring cylinder and pour some water into it (Do not fill the cylinder completely). Note down the volume of water from the readings of the measuring cylinder. Take it as V_1. Now take a small stone and tie it with a thread. Immerse the stone inside the water by holding the thread. This has to be done such that the stone does not touch the walls of the measuring cylinder. Now, the level of water will raise. Note down the volume of water and take it as V_2. The volume of the stone is equal to the raise in the volume of water.



Volume of stone = $V_2 - V_1$ =

Ans. V_1 = 30 cc, V_2 = 40 cc; Volume of stone = $V_2 - V_1$ = 40cc – 30cc = 10cc

ACTIVITY - 4

(a) Take an iron block and a wooden block of same mass (say 1kg each). Measure their volume. Which one of them has more volume and occupies more volume?

(b) Take an iron block and a wooden block of same size. Weigh them and measure their mass. Which one of them has more mass?

Ans. (a) Wooden block has more volume and occupies more volume. (As the molecules of wood are loosely packed)

(b) Iron block has more mass. (In iron block, molecules are closely packed).

★★★

Additional Questions

I. Choose the correct answer.

1. The unit of volume is _____

(a) m^3 (b) m^2 (c) cm^3 (d) km **Ans (a) m^3**

2. Physical quantities are classified into _____ types

(a) three (b) two
(c) four (d) none of the above **Ans (b) two**

3. The SI unit of speed is _____

(a) m/s^2 (b) m/s (c) km/h (d) m^2/s **Ans (a) m/s^2**

4. 1 litre = _____ cc

(a) 100 (b) 1000 (c) 10 (d) 0.1 **Ans (b) 1000**

5. The formula to calculate area of a rectangle is _____.

(a) length × breadth (b) side × side
(c) π × radius × radius (d) none of the above **Ans (a) length × breadth**

6. _____ is a derived quantity.

(a) length (b) mass (c) time (d) area **Ans (d) area**

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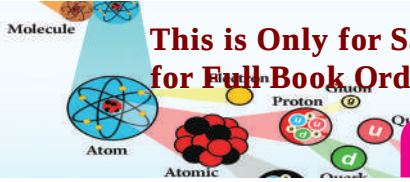

7. **The amount of space occupied by a three dimensional object is known as its ____**

(a) density (b) volume
(c) Area (d) mass

Ans (b) volume

8. **The maximum volume of liquid that a continer can hold is ____ .**

(a) area (b) volume
(c) capacity (d) density

Ans (c) capacity

9. **The shortest distance between the earth and the sun is called as ____ position.**

(a) Light year (b) normal
(c) perihelion (d) aphelion

Ans (c) Perihelion

10. **The largest distance between the earth and the sun is called as ____ position.**

(a) normal (b) perihelion
(c) aphelion (d) none of the above

Ans (c) aphelion

11. **____ is defined as the average distance between the earth and the sun.**

(a) Astronomical unit (b) Light year
(c) Kilometre (d) none

Ans (a) Astronomical unit

II. Fill in the Blanks.

1. The materials with higher density are called_____. **Ans denser**

2. The materials with lower density are called _____ **Ans rarer**

3. The area of irregularly shaped figures can be calculated with the help of a _____ **Ans graph sheet**

4. The SI unit of volume is _____. **Ans cubic metre or m^3**

5. The SI unit of density is _____. **Ans kg/m^3]**

6. The CGS unit of density is _____. **Ans g/cm^3**

7. If the density of a solid is lower than that of a liquid it _____ in that liquid **Ans floats**

8. If the density of a solid is higher than that of a liquid, it _____ in that liquid. **Ans sinks**

9. The total number of seconds in one year = _____ **Ans 3.15 3 × 107 second**

10. The average distance between the earth and the sun is about _____ million kilometre. **Ans 149.6**

11. The corresponding units of fundamental quantities are called _____ **Ans fundamental units**

III. True or False - if false give the correct statement.

1. **One square metre is the area enclosed inside a square of side 2 metre.**

Ans. False. Correct Statement : One square metre is the area enclosed inside a square of side **1 metre**.

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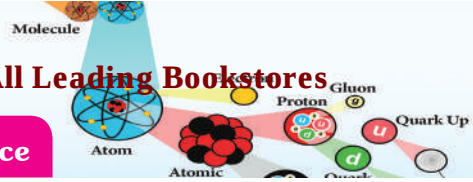

2. **Area is a derived quantity as we obtain by multiplying twice of the fundamental physical quantity length.**

Ans. True.

3. **Density of water is 100 kg/m^3.**

Ans. False. Correct statement: Density of water is **1000 kg/m^3.**

4. **Density is defined as the mass of the substance contained in unit volume.**

Ans. True.

5. **The lightness or heaviness of a body is due to volume**

Ans. False. Correct statement: The lightness or heaviness of a body is due to **density**.

6. **Neptune is 30 AU away from sun.**

Ans. True.

7. **The nearest star to our solar system is proxima centauri.**

Ans. True.

8. **The volume of a figure is the region covered by the boundary of the figure.**

Ans. False. Correct statement: The **area** of a figure is the region covered by the boundary of the figure.

9. **1 Light year = 9.46 × 10^5 m.**

Ans. True.

10. **One light year is defined as the distance travelled by light in vacuum during the period of one year.**

Ans. True.

IV. Match the following :

1.

1.	Length	(a)	ampere (A)
2.	time	(b)	kelvin (K)
3.	Mass	(c)	metre (M)
4.	Temperature	(d)	second (S)
5.	Electric current	(e)	kilogram (K)

Ans (1-c. 2-d, 3-e, 4- b, 5 -a)

2.

	Plane figure		**Area**
1.	Rectangle	(a)	$\pi \times r^2$
2.	Square	(b)	$\frac{1}{2} \times b \times h$
3.	Circle	(c)	$l \times b$
4.	Triangle	(d)	$s \times s$

Ans (1-c. 2-d, 3-a, 4- b)

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3.

1.	Amount of substance	(a)	Litre
2.	Luminous intensity	(b)	Metre
3.	Vegetables	(c)	Mole
4.	Cloth	(d)	Candela
5.	Milk	(e)	kg

Ans (1-c. 2-d, 3-e, 4- b, 5-a)

V. Assertion and Reason.

Mark the correct choice as

(a) Both A and R are true but R is not the correct reason.
(b) Both A and R are true and R is the correct reason.
(c) A is true but R is false.
(d) A is false but R is true.

1. Assertion (A) : **The distance between two celestial bodies is measured by the unit of light year.**

Reason (R) : **The distance travelled by the light in one year in vacuum is called one light year.**

Ans (a) Both A and R are true but R is not the correct reason

2. Assertion (A) : **It is easier to swim in sea water than in river water.**

Reason (R) : **Density of sea water is more than that of river water**

(a) Both A and R are true but R is not the correct reason.
(b) Both A and R are true and R is the correct reason.
(c) A is true but R is false.
(d) A is false but R is true.

Ans (b) Both A and R are true and R is the correct reason.

3. Assertion (A) : **Volume is a derived quantity.**

Reason (R) : **The amount of space occupied by a three dimensional object is known as its volume.**

Ans (a) Both A and R are true but R is not the correct reason.

VI. Very short Answers:

1. Write the SI unit of speed.

Ans. m/s

2. What is the fundamental unit of amount of substance?

Ans. mole (mol)

3. What are the types of physical quantity?

Ans. (i) Fundamental quantity (ii) Derived quantity.

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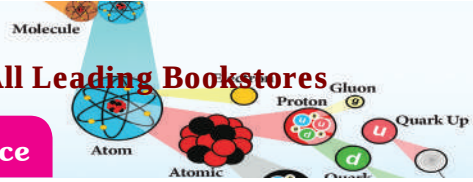

4. What is the SI unit of electric charge?

Ans. Coulomb (C)

5. Mention the formula to calculate area of a circle?

Ans. $\pi \times r^2 = \pi r^2$.

6. How do you find the area of irregularly shaped figures?

Ans. Graphical method.

7. How will you determine the volume of a liquid?

Ans. By using measuring cylinder.

8. What are the other units used to measure the volume of liquids?

Ans. Gallon, ounce and quart.

9. Which one of the following has more volume. Iron block or a wooden block of same mass.

Ans. Wooden block.

10. Which one of the following has more density. Water or cooking oil.

Ans. Water

11. What is the special unit used by astronomers for measuring the distance in deep space?

Ans. Light year.

12. What is the distance between the earth and proxima centauri star?

Ans. 4.22 light years.

13. How many fundamental quantities are there is SI units?

Ans. Seven.

VII. Short Answer.

1. What is fundamental quantity? Give examples.

Ans. A set of physical quantities which cannot be expressed in terms of any other quantities are known as fundamental quantities. Ex: Length, mass, time.

2. Define mass Mention its unit.

Ans. Mass is the amount of matter contained in a body. It's unit is kilogram (kg).

3. What are the multiples and sub multiples of mass?

Ans. The multiples of mass are quintal and metric tonne.
The sub-multiples of mass are gram and milligrams.

4. What is physical quantity? give example.

Ans. A quantity that can be measured is called a physical quantity.
For example, the length of a piece of cloth, the time at which school begins.

5. What do you mean by 'unit'?

Ans. The known measure of a physical quantity is called the unit of measurement.

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6. What is measurement?

Ans. Comparison of an unknown quantity with a standard quantity is called measurement.

7. What is meant by area?

Ans. Area is the measure of the region inside a closed line.

8. What is capacity of a container?

Ans. The volume of liquid which a container can hold is called its capacity.

9. What is the relation between density, volume and mass?

Ans. Density = $\frac{\text{mass}}{\text{volume}}$

10. Define astronomical unit.

Ans. One astronomical unit is defined as the average distance between the earth and the sun. 1AU = 1.496×10^{11} m or 149.6×10^{6} m

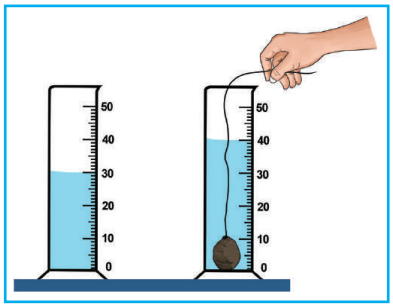
11. Define one light year.

Ans. One light year is defined as the distance traveled by light in vacuum during the period of one year. 1 light year = 9.46×10^{15} m

VIII. Long Answer

1. How will you find the volume of an irregularly shaped object (stone) by using measuring cylinder?

Ans.



(i) Take a measuring cylinder and pour some water into it.

(ii) Note down the volume of water from the readings of the measuring cylinder.

(iii) Take it as V_1

(iv) Now take Q small stone and tie it with a thread.

(v) Immerse the stone inside the water by holding the thread.

(vi) This has to be done such that the stone does not touch the walls of the measuring cylinder.

(vii) Now the level of water has raised.

(viii) Note down the volume of water and take it to be V_2

The volume of the stone is equal to the raise in the volume of water.

V_1 = 30cc, V_2 = 40cc

Volume of stone = $V_2 - V_1 = 40 - 30 =$ **10 cc**

2. How will you find the area of irregular objects?

Ans.

(i) Place the irregular object on a graph sheet and draw its outline. Then remove the object.

(ii) To find the area enclosed by the outline count the number of small squares.

(iii) If more than half-a-square is inside the boundary, count it as one otherwise neglect it.

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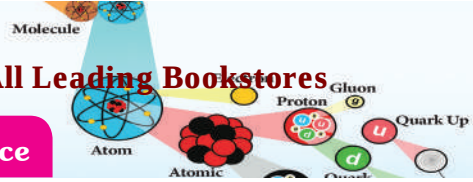

(iv) The area of each small square is 1sq. mm.

(v) Area of the irregular object = No. of squares × 1 sq.mm.

IX. Problems for practice:

1. A piece of iron weighs 230 g and has a volume of 20cm^3. Find the density of iron.

Solution: Mass of iron (m) = 230g

Volume of iron (v) = 20 cm^3

$\therefore$ Density of iron D = $\frac{m}{v} \times \frac{23\cancel{0}}{2\cancel{0}}$ = **11.5 g/cm3**

2. Find the mass of silver of volume 50 cm^3 and density10.5 g / cm^3.

Solution: Mass of silver (M) = ?

Volume of silver (V) = 50 cm^3

Density of silver D = 10.5 g/cm^3

Density (D) = $\frac{\text{mass}(m)}{\text{volume}(v)}$

mass (M) = Density × Volume

= 10.5 × 50 = **525g**

3. The volume of water is a measuring cylinder is 50 ml. When a stone is tied to a string is immersed in the water, the water level rises to 83 ml. Find the volume of the stone.

Solution: Volume of water V_1 = 50 ml

Volume of water V_2 = 83 ml

Volume of the stone (V) = $V_2 - V_1$

= 83 – 50

= 33 ml

1ml = 1cm^3

33ml = 33 × 1cm^3

Volume of the stone = 33cm^3

4. Find the area of the following regular shaped figures :

a. A circle whose diameter is 70m.

b. A triangle whose height is 11m and base is 7m

c. A square of side 20m

Solution: (a) area of a circle = πr^2

$= \frac{22}{\cancel{7}} \times \overset{5}{\cancel{35}} \times 35$

= 3850m^2

$r = \frac{d}{2} = \frac{70}{2}$

r = 35m

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Solution: (b) area of a triangle A $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 7 \times 11 = \frac{77}{2} = \boxed{38.5\ m^2}$

Solution: (c) area of a square A = side × side

= 20 × 20

= $\boxed{400 m^2}$

X. Creative questions: HOTS

1. Why does an iron needle sink in water, but not an iron ship?

Ans. Iron needle is compact and its density is 7.6 g/cm^3. Thus, as the density of iron needle is more than 1 g/cm^3 therefore, it sinks in water.

However, the iron ship is constructed in such a way that it is mostly hollow from within, thus, the volume of iron ship becomes very large as compared to its mass and hence its density is less than 1g/cm^3 . As the density of iron ship is less than 1g/cm^3, therefore it floats in water.

2. Wooden block occupies more volume than the iron ball of same mass. Give reason.

Ans. The matter (atoms and molecules) is more densely packed in iron. Whereas is wooden block the matter is loosely packed.

In the language of science, we will say that the density of iron is more than the density of wooden block.

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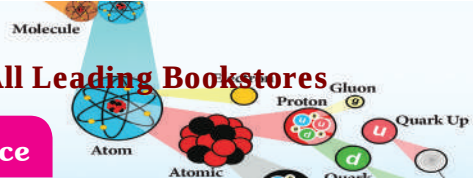

UNIT TEST

Time : 60 min. **Marks : 25**

I. Choose the correct answer: (3×1 = 3)

1. **The area of a spherical object is _____.**

(a) $l \times b \times h$ (b) $\pi r^2 h$ (c) $\frac{4}{3} \times \pi \times r^2$ (d) a^3

2. **What is the SI unit of density?**

(a) a^2 (b) mm^3 (c) kg/m^3 (d) kg/m^2

3. **The speed of light in vacuum is _____.**

(a) 10×10^6 m/s (b) 3×10^8 m/s

(c) 1.496×10^{11} m/s (d) 2×10^8 m/s

II. Fill in the blanks. (3 × 1 = 3)

4. The unit of amount of substance is _____.

5. There are _____ fundamental physical quantities in SI units.

6. The materials with higher density are called _____.

III. Match the following (4 × 1 = 4)

7.	Cylinder	(a)	litre
8.	Mass	(b)	1000 kg/m^3
9.	Volume of liquids	(c)	$\pi r^2 h$
10.	water	(d)	kg

IV. Answer in one word: (4 × 1 = 4)

11. What is the symbol of unit of temperature?

12. Name the method which is used to find the area of irregularly shaped figures.

13. What is the formula to calculate volume of a cube?

14. Name the unit which is used to measure distance between the two stars.

V. Answer the following in one or two sentences: (3 × 2=6)

15. Define derived quantity.

16. Heavy objects sink in water and lighter objects float in water. give reason.

17. What do you mean by the term 'capacity of the container?

18. What is light year?

19. Calculate the volume of wood of mass 5000 kg, when density of wood is 0.5g cm^{-3}

VI. Answer the following in detail: (5 × 1 = 5)

20. (a) How will you find the area of irregular objects?

(or)

(b) Describe the graphical method to find the area of an irregularly shaped plane figure.

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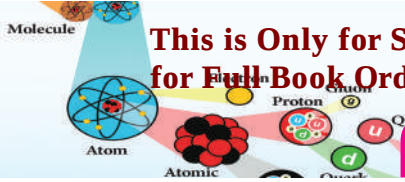

Answer Key

I. 1. (c) $\frac{4}{3}\times\pi\times r^2$ 2. (c) kg/m^3 3. (b) 3×10^8 m/s

II. 4. mole 5. seven 6. denser

III. 7 - c, 8 - d, 9 - a, 10 - b.

IV. 11. kelvin 12. Graphical method

13. side × side × side 14. Astronomical unit

V. 15. All other physical quantities which can be obtained by multiplying, dividing or by mathematically combining the fundamental quantities are known as"derived quantities".

16. The substances with the density more than (heavier objects) $1g/cm^3$ sink in water.

Conversely, the substances having density less than $1g/cm^3$, float in water (lighter objects)

17. The maximum volume of liquid that a container can hold is known as the "capacity of the container"

18. One light year is defined as the distance travelled by light in vacuum during the period of one year. 1 Light year = 9.46×10^{15} m.

19. Mass of wood M = 5000 kg

Density of wood D = $0.59 gcm^{-3}$

Volume of wood V = ?

Formula : Volume (V) = $\frac{\text{Mass(M)}}{\text{Density(D)}}$

$= \frac{5000}{0.5} = \frac{5000\times10}{0.5\times10}$

V = $10{,}000 m^3$

or

$= 10 \times 10^3 m^3$

VI. 20. a) Refer Sura's Guide Q. No. VIII - 2.

(or)

b) Refer Sura's Guide Q. No. X - 1

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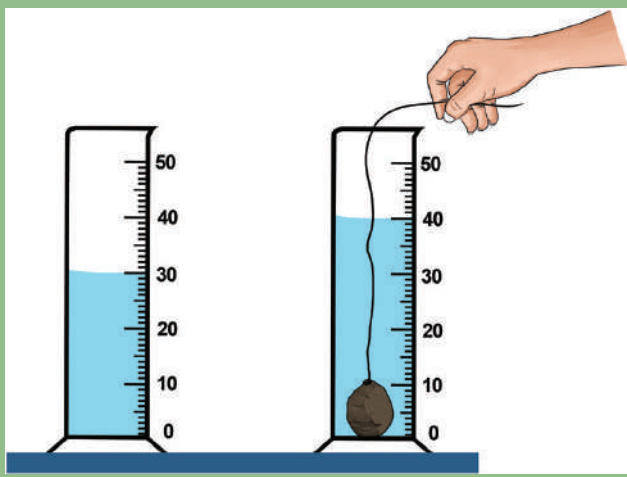
TERM II



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CONTENTS

Unit	Name	Page No.
1.	Heat and Temperature	129 - 144
2.	Electricity	145 - 162
3.	Changes Around Us	163 - 182
4.	Cell Biology	183 - 196
5.	Basis of Classification	197 - 207
6.	Digital Painting	207 - 210
	Sura's Model Summative Assessment Term II	211 - 214

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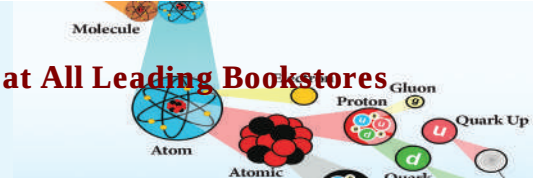
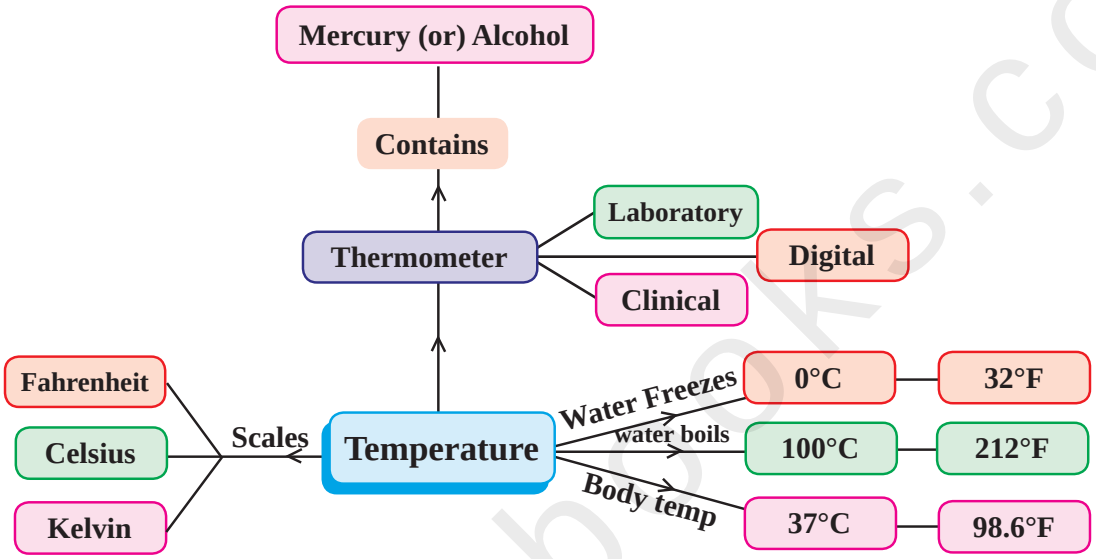


Unit 1 HEAT AND TEMPERATURE

CONCEPT MAP



Must Know Definitions

Temperature	:	The measurement of warmness or coolness of a substance.
Thermometer	:	The most common instrument to measure temperature.
Kelvin scale	:	It is the SI unit of measuring temperature.
Fahrenheit scale	:	Fahrenheit is a common unit to measure human body temperature.
Celsius scale	:	Celsius is the common unit of measuring temperature.

Formulae to Remember

1. To convert Fahrenheit into Celsius: $C = (F - 32) \times \frac{5}{9}$

2. To convert Celsius in to Fahrenheit: $F = \frac{9C}{5} + 32$

3. To convert Celsius in to Kelvin: $K = C + 273.15$

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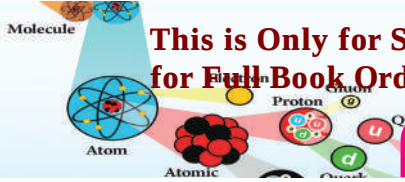

Evaluation

I. Choose the correct answer:

1. International unit of measuring temperature is _____

(a) Kelvin (b) Fahrenheit
(c) Celsius (d) Joule

Ans (a) Kelvin

2. In thermometer when bulb comes in contact with hot object, liquid inside it

(a) expands (b) contracts
(c) remains same (d) none of above

Ans (a) expands

3. The body temperature of a healthy man is;

(a) 0°C (b) 37°C (c) 98°C (d) 100°C

Ans (b) 37°C

4. Mercury is often used in laboratory thermometers because it _____

(a) is a harmless liquid
(b) is silvery in colour and is attractive in appearance
(c) Expands uniformly
(d) is a low cost liquid

Ans (c) Expands uniformly

5. Which of the following temperature conversions is incorrect
K (Kelvin) = °C (Celsius) + 273.15

	°C	K
(a)	–273.15	0
(b)	–123	+150.15
(c)	+ 127	+ 400.15
(d)	+ 450	+ 733.15

Ans (d) +450, +733.15

II. Fill in the blanks:

1. Doctor uses _____ thermometer to measure the human body temperature.

Ans clinical

2. At room temperature Mercury is in _____ state. **Ans liquid**

3. Heat energy transfer from _____ to _____.

Ans higher temperature region, lower temperature resgion

4. –7°C temperature is _____ than 0°C temperature. **Ans less**

5. The common laboratory thermometer is a _____ thermometer

Ans mercury

III. Match the following:

i)	Clinical thermometer	A form of energy
ii)	Normal temperature of human body	100°C
iii)	Heat	37°C
iv)	Boiling point of water	0°C
v)	Melting point of water	Kink

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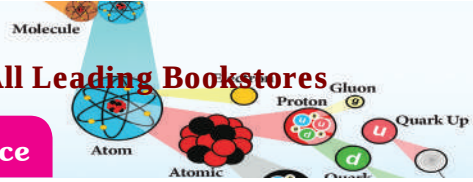

Ans.

i)	Clinical thermometer	Kink
ii)	Normal temperature of human body	37°C
iii)	Heat	A form of energy
iv)	Boiling point of water	100°C
v)	Melting point of water	0°C

IV. Give very short answer:

1. Temperature of Srinagar (J&K) is –4°C and in Kodaikanal is 3°C which of them has greater temperature ? What is the difference between the temperatures of these two places?

Ans. Kodaikanal has greater temperature.

Temperature of srinagar (J &K) = –4°C

Temperature of kodaikanal = 3°C

Difference = –4°C + 3°C

= 7°C

Srinagar is colder than that of kodaikanal.

2. Jyothi was prepared to measure the temperature of hot water with a clinical thermometer. Is it right or wrong? Why?

Ans. It is wrong, because clinical thermometer has small temperature range (35°C to 42°C or 94°F to 108°F). If it is used to measure the temperature of hot water, the glass will crack/ burst due to excessive pressure created by expansion of mercury.

3. A clinical thermometer is not used to measure the temperature of air, why?

Ans. The range of the clinical thermometer is less than that of thermometer used to measure temperature of air.

4. What is the use of kink in clinical thermometer?

Ans. A kink in clinical thermometer prevents the mercury from flowing back into the bulb when the thermometer is taken out of the patient's mouth, so that the temperature can be noted conveniently.

5. Why do we jerk a clinical thermometer before we measure the body temperature?

Ans. The jerk to the thermometer will allow the mercury level to flow into the bulb so that the mercury level is below the normal temperature.

V. Give Short Answer:

1. Why do we use mercury in thermometers? Can water be used instead of mercury? What are the problems in using it?

Ans. (i) We use mercury in thermometers as they remain in liquid form even with a change of temperature in it.

(ii) A small change in the temperature causes change in volume of a liquid.

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(iii) Water cannot be used as a thermometric liquid, because it is not helpful to measure below 0°C and above 100°C.

(iv) Water is transparent. So it makes the reading of the scales of the thermometer more difficult, water wets the glass tube so its **steady** is glass tube.

(v) Due to this constraints it is not used as a thermometric liquid.

2. Swathi kept a laboratory thermometer in hot water for some time and took it out to read the temperature. Ramani said it was a wrong way of measuring temperature. Do you agree with Ramani? Explain your answer.

Ans. Yes, I agree with Ramani.

(i) Laboratory thermometer does not have a kink. So, when Swathi takes out the thermometer, the level can go back because of absence of kink.

(ii) So Swathi should note the reading when the thermometer bulb has surrounded by hot water.

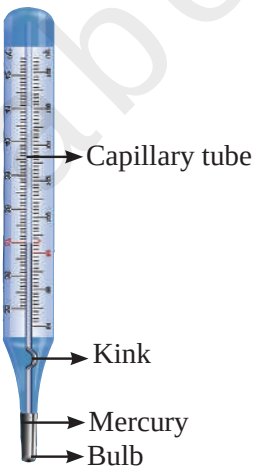
3. The body temperature of Srinath is 99°F. Is he suffering from fever? If so, why?

Ans. Srinath is having a fever because the normal body temperature is 98.6°F.

VI. Give long answer:

1. Draw the diagram of a clinical thermometer and label its parts.

Ans.



2. State the similarities and differences between the laboratory thermometer and the clinical thermometer.

Ans. **Similarities between laboratory thermometer and the clinical thermometer:**

(i) Both clinical and laboratory thermometers have long, narrow and uniform glass tubes.

(ii) Bulbs contain mercury.

(iii) Both have celsius scale.

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Differences:

S.No	Laboratory thermometer	Clinical thermometer
1.	Laboratory thermometer is generally scaled from –10°C to 110°C.	Clinical thermometer is scaled from 35°C to 42°C or from 94°F to 108°F.
2.	Mercury level falls on its own as no kink is present.	Mercury level does not fall on its own, as there is a kink near the bulb to prevent the fall of mercury level.
3.	Temperature is read while keeping the thermometer in the source of temperature, e.g. a liquid or any other thing.	Temperature can be read after removing the thermometer from armpit or mouth.
4.	No need to give jerk to lower the mercury level.	To lower the mercury level jerks are given.
5.	It is used to take temperature in laboratory.	It is used for taking the body temperature.

VII. Higher Order Thinking questions:

1. What must be the temperature in Fahrenheit, so that it will be twice its value in Celsius?

Ans. According to the question,

$$F = 2C \text{ and } C_1 = C$$

$$F = \frac{9C}{5} + 32$$

$$2C = \frac{9}{5} C + 32$$

$$2C - \frac{9}{5} C = 32$$

$$\frac{10C - 9C}{5} = 32$$

$$\frac{1C}{5} = 32$$

So, $$1\ C = 32 \times 5$$

$$\boxed{C = 160°}$$

$$\therefore F = 2C = 2 \times 160°$$

$$\boxed{F = 320°}$$

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2. Go to a veterinary doctor (a doctor who treats animals). Discuss and find out the normal temperature of domestic animals and birds.

Ans.

1.	Dog	38.9°C
2.	Horse	38°C
3.	Rabbit	38.3°C
4.	Cow	38.6°C
5.	Cat	39°C
6.	Goat	39.7°C
7.	Pigeon	44.1°C
8.	Crow	40°C
9.	Duck	40.7°C
10.	Kadaknath	41.8°C
11.	Parrot	41°C

Intext Activites

➝ ACTIVITY - 1

What is required?

A small glass bottle, a rubber cork, an empty refill, water, colour, a candle, a fork, a paper.

What to do?

- Take a small glass bottle. Fill it with coloured water.
- Make hole at the centre of the rubber cork.
- Pass empty refill from the hole of the rubber cork.
- Make the bottle air tight and observe the water raised in the refill.
- Make a scale on paper, place it behind the refill and note down the position of the surface of water.
- Hold bottle with fork and supply heat to it with candle. Then observe.

What is the change in the surface of water?

Ans. The level of water increases.

- Stop the supply of heat. When water is cooled, observe the surface of water in the refill,

what change takes place? Why?

Ans. The level of water comes to the original position.

When, a liquid is heated, it expands and when it is cooled down, it contracts.

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ACTIVITY - 2

What is required?

A big bottle, a balloon, threads, candle, water, fork.

What to do?

- Take one big bottle, and fill some water in it.
- Attach one balloon on the mouth of bottle and fix it with thread.
- Hold bottle with a fork. Heat the bottle with a candle and take observation.

What change occurs in the state of balloon after heating the bottle?

Ans. The balloon expands.

What change occurs in the state of balloon after heating the bottle? Why?

Ans. The air inside it gets heated and expands. This causes the balloon to stretch and expand.

- Now, let the bottle get cooled down.

What change occurs in the state of balloon after bottle gets cool down? Why?

Ans. The temperature within the bottle reduces causing the air to cool down. This causes the balloon to contract.

When gases substance gets heat, it expands; when it cools it contracts.

Why does a tyre get burst in summer?

Ans. During summer, the air inside the tyre of a vehicle will get heated up with the increase in pressure of the air inside the tyre. As there is no place to air to escape tyre will get bursted.

ACTIVITY - 3

Measure your body temperature.

Wash the thermometer preferably with an antiseptic solution. Hold it firmly by the end and give it a few jerks. These jerks will bring the level of Mercury down. Ensure that it falls below 35°C (95°F). Now place the thermometer under your tongue or arm pit. After one minute, take the thermometer out and note the reading. It tells you your body temperature.

What did you record as your body temperature?

Ans. 37°C

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1.6 Numerical problems:

3. Convert the given temperature :

1. 45°C = _____°F

Solution:

$$F = \frac{9C}{5} + 32$$

$$= \frac{9 \times 45^{9}}{\cancel{5}} + 32$$

$$= 81 + 32$$

45°C = 113°F

2. 20°C = _____°F

Solution:

$$F = \frac{9C}{5} + 32$$

$$= \frac{9 \times 20^{4}}{\cancel{5}} + 32$$

$$= 36 + 32$$

20°C = 68°F

3. 68°F = _____°C

Solution:

$$C = (F - 32) \times \frac{5}{9}$$

$$= (68 - 32) \times \frac{5}{9}$$

$$= \cancel{36}^{4} \times \frac{5}{\cancel{9}}$$

68°F = 20°C

4. 185°F = _____°C

Solution:

$$C = (F - 32) \times \frac{5}{9}$$

$$= (185 - 32) \times \frac{5}{9}$$

$$= \cancel{153}^{17} \times \frac{5}{\cancel{9}}$$

185°F = 85°C

5. 0°C = _____K

Solution:

$$K = C + 273$$

$$= 0 + 273$$

0°C = 273K

6. –20°C = _____K

Solution:

$$K = C + 273$$

$$= -20 + 273$$

–20°C = 253K

7. 100K = _____°C

Solution:

$$C = K - 273$$

$$= 100 - 273$$

100K = –173°C

8. 272.15K = _____°C

Solution:

$$C = K - 273$$

$$= 272.15 - 273$$

272.15K = –0.85°C

Additional Questions

I. Choose the correct answer.

1. **Heat energy is the total _____ of the particles that make up a substance.**

(a) potential energy (b) kinetic energy
(c) temperature (d) none

Ans **(b) kinetic energy**

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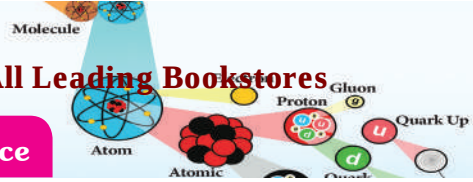

2. **Heat energy is always transferred from _____ to _____ temperatures.**

(a) lower, higher (b) higher, lower
(c) conductor, insulator (d) both a and b

Ans **(b) higher, lower**

3. **A clinical thermometer is calibrated from _____ to _____.**

(a) 10°C to 100°C (b) 32°C to 110°C
(c) 0°C to 100°C (d) 35°C to 42°C

Ans **(d) 35°C to 42°C**

4. **The thermometer which ranges from –10°C to 110°C is _____.**

(a) clinical thermometer (b) digital thermometer
(c) laboratory thermometer (d) All of these

Ans **(c) laboratory thermometer**

5. **Which one of the following scale has lower fixed point as 0°C?**

(a) Kelvin scale (b) Fahrenheit scale
(c) Celsius scale (d) All of these

Ans **(c) Celsius scale**

6. **The lower fixed point on the Celsius scale is _____.**

(a) melting point of mercury (b) melting point of ice
(c) boiling point of water (d) none

Ans **(b) melting point of ice**

7. **The measure of degree of hotness or coldness of a body is called _____.**

(a) heat energy (b) celsius
(c) kelvin (d) temperature

Ans **(d) temperature**

8. **Digital thermometer is widely used for the measurement of the temperature due to _____.**

(a) Analog display (b) Mercury
(c) High accuracy (d) Low accuracy

Ans **(c) High accuracy**

9. **Temperature of boiling water cannot be measured by a _____ thermometer.**

(a) laboratory (b) digital (c) clinical (d) both b & c

Ans **(d) both b & c**

10. **When a substance is heated, its temperature _____.**

(a) rises (b) falls (c) remains same (d) none

Ans **(a) rises**

II. Fill in the Blanks.

1. Digital thermometers do not use _____.

Ans **mercury**

2. In a thermometer, when liquid gets heated, it _____ and when it is cooled down, it _____.

Ans **expands, contracts**

3. The SI unit of temperature is _____.

Ans **kelvin**

4. A small change in the temperature causes change in _____ of a liquid.

Ans **volume**

5. The freezing point of alcohol is less than _____.

Ans **–100°C**

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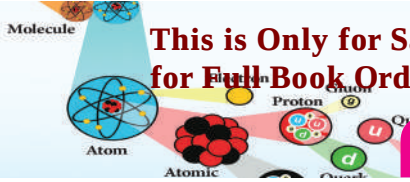

6. All clinical thermometers have a _____ that prevents mercury from flowing back into the bulb. **Ans kink**

7. A clinical thermometer indicates temperatures from a minimum of _____ °F to a maximum of _____ °F. **Ans 94°F, 108°F**

8. Before use, the mercury level in clinical thermometer should be below _____. **Ans 35°C or 94°F**

9. The coldest natural temperature ever recorded on earth is _____. **Ans 178.45K**

10. The hottest natural temperature ever recorded on earth is_____. **Ans 329.85K**

11. Temperature of the universe in the earliest moments after the big bang is _____. **Ans 10^{32} K**

III. True or False - If false give the correct statement.

1. **Temperature is related to how fast the atoms within a substance are moving.**
Ans. True.

2. **Mercury is a poor conductor of heat.**
Ans. False. Mercury is a **good conductor** of heat.

3. **Fahrenheit scale is more sensitive than the celsius scale.**
Ans. True.

4. **In humans, the average internal temperature is 98.60°C.**
Ans. False. In humans, the average internal temperature is **98.60°F**.

5. **Digital thermometers are mainly used to take the body temperature.**
Ans. True.

6. **The glass of a clinical thermometer will burst due to excessive pressure created by contraction of mercury.**
Ans. False. The glass of a clinical thermometer will burst due to excessive pressure created by **expansion** of mercury.

7. **In Greek, Centium means 100 and Gradus means steps, both words make it Centigrade and later Celsius.**
Ans. True.

8. **Kelvin is written as K also known as absolute scale as it starts from absolute zero temperature.**
Ans. True.

9. **The temperatures in Celsius and in Fahrenheit will be same at –40°.**
Ans. True.

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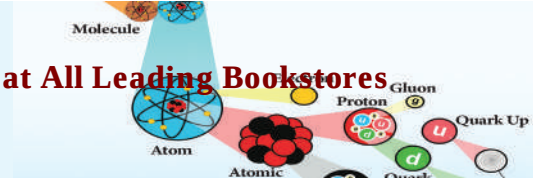

IV. Match the following :

1.	Mercury	(a)	Maximum minimum thermometer
2.	Weather report	(b)	-173.15°C
3.	32°F	(c)	Opaque and shining
4.	100 k	(d)	0°C

Ans (1-c. 2-a, 3-d, 4- b)

V. Assertion and Reason.

Mark the correct choice as

(a) Both A and R are true and R is the correct explanation of assertion.
(b) Both A and R are true but R is not the correct explanation of assertion.
(c) A is true but R is false.
(d) A is false but R is true.

1. **Assertion (A) :** Heat energy is transferred from one body to another due to a temperature difference between them.

Reason (R) : Heating a substance causes a rise in temperature.

Ans (b) Both A and R are true but R is not the correct explanation of assertion.

Correct reason: Heat energy always travels from hotter object to colder objects.

2. **Assertion (A) :** When a very hot liquid is poured into a thick glass tumbler it cracks.

Reason (R) : Unequal expansion of inner and outer glass walls causes the glass to crack.

Ans (a) Both A and R are true and R is the correct explanation of assertion

VI. Very short Answers:

1. Mention the three units which are used to measure the temperature.

Ans. The three units which are used to measure the temperature: Degree Celsius, Fahrenheit and Kelvin.

2. What is the boiling point of mercury?

Ans. 357°C

3. What is the freezing point of alcohol?

Ans. Less than –100°C

4. Mention the use of laboratory thermometers.

Ans. To measure the temperature in laboratories for scientific research.

5. What is the average internal temperature of human body?

Ans. 37°C (98.6°F)

6. What is the freezing point of water in Fahrenheit scale?

Ans. 32°F

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7. At what temperature the value will be same in Celsius and in Fahrenheit?

Ans. –40°

8. Name the principle which is used in thermometer.

Ans. Liquids expand on heating and contract on cooling.

VII. Short Answer.

1. Mention any two precautions to be followed while using a clinical thermometer.

Ans. (i) The thermometer should be washed before and after use, preferably with an antiseptic solution.

(ii) Jerk the thermometer a few times to bring the level of the mercury down.

2. What are the uses of laboratory thermometers?

Ans. Laboratory thermometers are used to measure the temperature in school and other laboratories for scientific research. They are also used in the industry as they can measure temperatures higher than what clinical thermometers can record.

3. Mention any two properties of alcohol.

Ans. (i) The freezing point of alcohol is less than −100°C. So it can be used to measure very low temperatures.

(ii) Its expansion per degree Celsius rise in temperature is very large.

4. What is the use of kink in clinical thermometers?

Ans. Kink prevents the mercury from flowing back into the bulb when the thermometer is taken out of the patient's mouth. So that the temperature can be noted conveniently.

5. Why mercury or alcohol is used in thermometers?

Ans. Mostly Alcohol and Mercury are used in thermometers as they remain in liquid form even with a change of temperature in them. A small change in the temperature causes change in volume of a liquid. We measure this temperature by measuring expansion of a liquid in thermometer.

6. We are advised to avoid keeping clinical thermometer in the sun or near a flame. Why?

Ans. A Clinical thermometer has small temperature range. The glass will crack/ burst due to excessive pressure created by expansion of mercury.

VIII. Long Answer:

1. Explain the properties of mercury.

Ans. (i) Its expansion is uniform. (For equal amounts of heat it expands by equal lengths.)

(ii) It is opaque and shining.

(iii) It does not stick to the sides of the glass tube.

(iv) It is a good conductor of heat.

(v) It has a high boiling point (357°C) and a low freezing point (−39°C). Hence a wide range of temperatures can be measured using a mercury thermometer.

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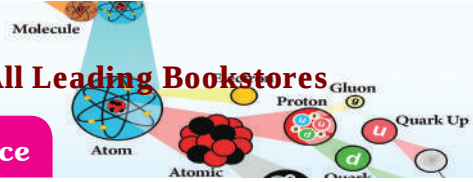

2. Explain the construction and working of clinical thermometer.

Ans.

(i) Clinical thermometers are used to measure the temperature of a human body, at home, clinics and hospitals.

(ii) All clinical thermometers have a kink that prevents the mercury from flowing back into the bulb when the thermometer is taken out of the patient's mouth, so that the temperature can be noted conveniently.

(iii) There are temperature scales on either side of the mercury thread, one in Celsius scale and the other in Fahrenheit scale.

(iv) Since the Fahrenheit scale is more sensitive than the Celsius scale, body temperature is measured in F only.

(v) A clinical thermometer indicates temperatures from a minimum of 35°C or 94°F to a maximum of 42°C or 108°F.

3. Explain the precautions to be followed while using clinical thermometer.

Ans.

(i) The thermometer should be washed before and after use, preferably with an antiseptic solution.

(ii) Jerk the thermometer a few times to bring the level of the mercury down.

(iii) Before use, the mercury level should be below 35°C or 94°F.

(iv) Do not hold the thermometer by its bulb.

(v) Keep the mercury level along your line of sight and then take the reading.

(vi) Handle the thermometer with care. If it hits against some hard object, it may break.

(vii) Do not place the thermometer in a hot flame or in the hot sun.

4. (a) Write a note on laboratory thermometer.
(b) Write the precautions to be followed while using a laboratory thermometer.

Ans.

(a) Laboratory Thermometer:

(i) Laboratory thermometers are used to measure the temperature in school and other laboratories for scientific research.

(ii) They are also used in the industry as they can measure temperatures higher than what clinical thermometers can record.

(iii) The stem and the bulb of a lab thermometer are longer when compared to that of a clinical thermometer and there is no kink in the lab thermometer.

(iv) A laboratory thermometer has only the Celsius scale ranging from −10°C to 110°C.

(b) Precautions to be Followed While Using a Laboratory Thermometer:

(i) Do not tilt the thermometer while measuring the temperature. Place it upright.

(ii) Note the reading only when the bulb has been surrounded by the substance from all sides.

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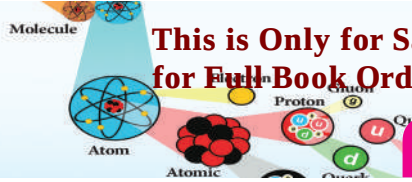

5. Explain how do you determine the temperature of hot water using laboratory thermometer?

Ans.
(i) Take some water in a beaker.
(ii) Take a laboratory thermometer and immerse its bulb end in water; holding it vertically. Ensure to dip whole portion of bulb end. The bulb end should not touch the bottom or side of the beaker.
(iii) Observe the movement of rise of mercury. When it becomes stable, take the reading of the thermometer.
(iv) Repeat this with hot water and take the reading.

6. (a) write a note on digital thermometer.
(b) Mention the precaution to be followed while using digital thermometer.

Ans. **(a) Digital Thermometer:**
(i) Mercury is a toxic substance and is very difficult to dispose if a thermometer breaks.
(ii) These days, digital thermometers are available which do not use mercury.
(iii) Instead, it has a sensor which can measure the heat coming out from the body directly and from that can measure the temperature of the body.
(iv) Digital thermometers are mainly used to take the body temperature.

(b)
(i) Do not use a clinical thermometer for measuring the temperature of any object other than human body.
(ii) Avoid keeping it in the sun or near flame.

7. Explain the usage of digital thermometer.

Ans. **Usage of Digital thermometer:**
(i) Wash the tip with warm (not hot), soapy water.
(ii) Press the "ON" button.
(iii) Insert the tip of the thermometer into the mouth, bottom, or under the armpit.
(iv) Hold the thermometer in place until it beeps (about 30 seconds).
(v) Read the display.
(vi) Turn off the thermometer, rinse under water, and put it away in a safe place.

IX. Problems for practice:

Convert the given temperature:

1. 40°C = _____°F

Solution:

$$F = \frac{9C}{5} + 32$$

$$= \frac{9 \times \cancel{40}^{8}}{\cancel{5}} + 32$$

$$= 72 + 32$$

$$40°C = 104°F$$

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2. **0 K = _____°C**

Solution:

$$C = K - 273$$
$$= 0 - 273$$
$$\mathbf{0\ K = -273°C}$$

3. **–30°C = _____K**

Solution:

$$K = C + 273$$
$$= -30 + 273$$
$$\mathbf{-30°C = 243\ K}$$

X. Creative questions: HOTS

1. **What is the minimum possible temperature? Is there also a maximum possible temperature?**

Ans. The minimum possible temperature is 0 K. There is no limit to maximum temperature.

2. **Complete the table.**

Temperature	Celsius scale °C	Fahrenheit scale °F	Kelvin scale K
Boiling point of water	100	(i) ?	373.15
(ii) ?	0	32	(iii) ?
Mean temperature of human body	(iv)?	98.6	310.15
Room temperature (average)	72	(v)?	296.15

Ans. **(i)** 212°F **(ii)** Freezing point of water
(iii) 273.15 K **(iv)** 37°C **(v)** 23 K

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UNIT TEST

Time : 60 min. **Marks : 20**

I. Choose the correct answer: (2×1 = 2)

1. **In thermometer when bulb comes in contact with hot object, liquid inside it ____.**

(a) contracts (b) expands
(c) remains same (d) none of above

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2. **Digital thermometer is widely used for the measurement of the temperature due to _____.**

(a) mercury (b) analog display
(c) high accuracy (d) low accuracy

II. Fill in the blanks. (2 × 1 = 2)

3. At room temperature mercury is in _____ state.

4. The SI unit of temperature is _____.

III. Write true or false: (1 × 1 = 1)

5. Fahrenheit scale is more sensitive than the Celsius scale.

IV. Give very short answer: (3 × 1 = 3)

6. What is the use of kink in clinical thermometer?

7. Name the principle which is used in thermometer.

8. What is the freezing point of water in Fahrenheit scale?

V. Give short answer: (2 × 2=4)

9. Why do we use mercury in thermometers? Can water be used instead of mercury? What are the problems in using it?

10. Write any two properties of alcohol?

VI. Answer the following in detail: (2 × 4 = 8)

11. Write the similarities and differences between the laboratory and the clinical thermometer.

12. Write the precautions to be followed while using clinical thermometer.

Answer Key

I. 1. (b) expands 2. (c) High accuracy
II. 3. liquid 4. kelvin
III. 5. True
IV. 6. Kink prevents the mercury from flowing back into the bulb.
7. Liquids expand on heating and contract on cooling.
8. 32°F
V. 9. Refer Sura's Guide Q. No. V - 1
10. Refer Sura's Guide Q. No. VII - 4 (Additional)
VI. 11. Refer Sura's Guide Q. No. VI - 2
12. Refer Sura's Guide Q. No. VII - 3 (Additional)

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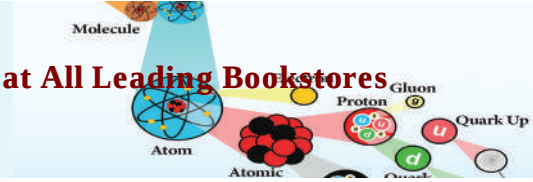
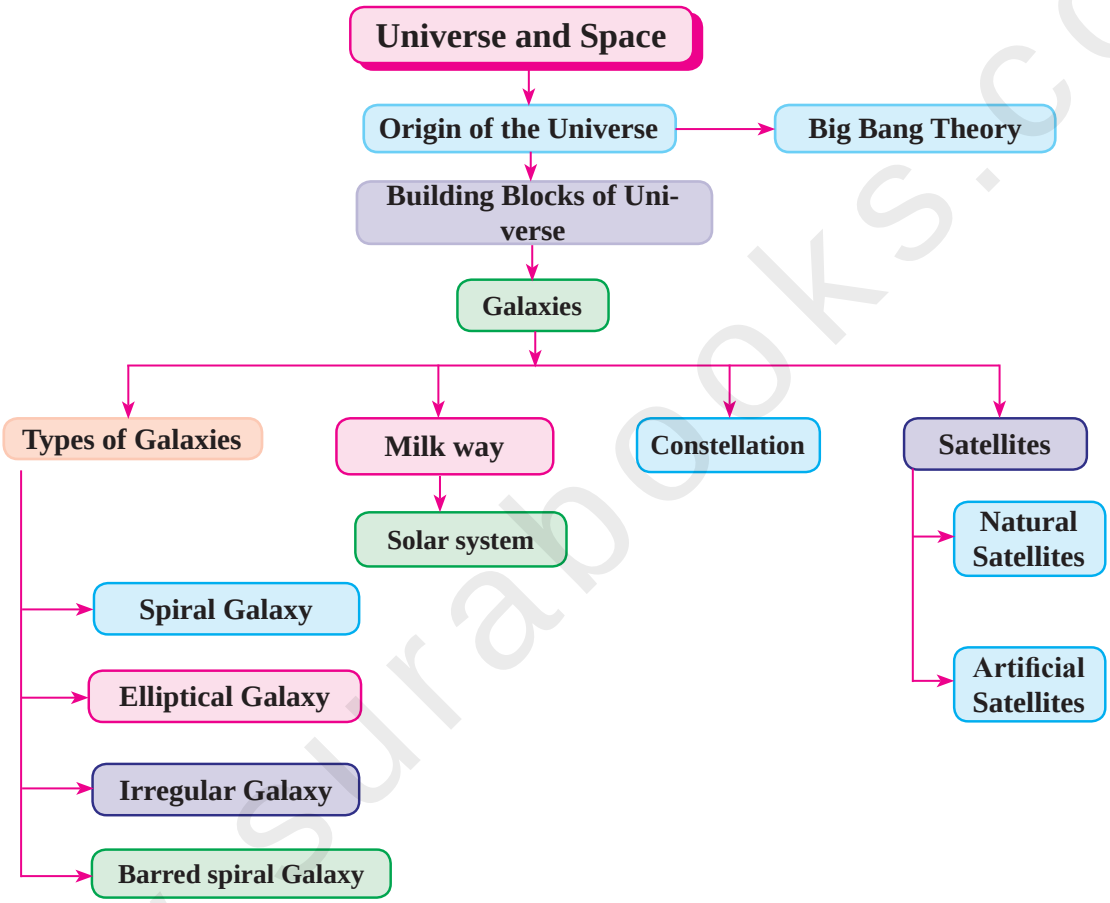


Unit 2 UNIVERSE AND SPACE

CONCEPT MAP



Must Know Definitions

Astronomy	:	The field of study of the universe is called **astronomy**.
Retrograde motion	:	The reversal of direction of planets is called as '**retrograde motion**'.
Galaxy	:	A **Galaxy** is a large collection of stars or cluster of stars and celestial bodies held together by gravitational attraction.
Constellation	:	A **constellation** is a recognizable pattern of stars in the night sky when viewed from the Earth.

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Satellite	:	An object that revolves around a planet in a stable and consistent orbit is called a **satellite**.
Star	:	A **Star** is a luminous heavenly body that radiate energy.
Natural satellites	:	All natural objects revolving around a planet are natural satellites.
Artificial satellites	:	Artificial satellites are man-made objects placed in an obit to rotate around a planet – usually the Earth.
Elliptical Galaxy	:	An elliptical Galaxy is a type of Galaxy having an approximately ellipsoidal shape and a smooth image.
Barred spiral Galaxy	:	A barred spiral Galaxy is a spiral Galaxy with a central bar-shaped structure composed of Stars.

Evaluation

I. Choose the correct answers:

1. The Moon takes _____ days to complete one revolution around the Earth.

(a) 25 (b) 26 (c) 27 (d) 28 **Ans (c) 27**

2. If the Moon is appeaing in the sky today near the star Karthikai , the position of the Moon after 27 days is near the Star

(a) Bharani (b) Karthikai (c) Rohini (d) Asvini **Ans (d) Asvini**

3. Telescope was invented by

(a) Han Lippershey (b) Galilio
(c) Nicolus Coppernicus (d) Ptolomy **Ans (a) Han Lippershey**

4. The galaxy containing young and hot stars is

(a) elliptical galaxy (b) irregular galaxy
(c) cluster (d) spiral galaxy **Ans (d) spiral galaxy**

5. With the launch of this satellite, ISRO became capable of launching 4 ton heavy satellites

(a) GSAT- 13 (b) GSAT- 14
(c) GSAT- 17 (d) Way par GSAT- 19

Ans (d) Way par GSAT-19

II. Fill in the blanks:

1. Waxing of Moon means _____ . **Ans growing or expanding**
2. Heliocentric model is proposed by _____ . **Ans Nicolus copernicus**
3. _____ is the prevailing model of Evolution of the Universe.

Ans The Big Bang Theory

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4. _____ is a large constellation which covers a large part of the sky.

Ans Ursa Major

5. _____ is the first satellite launched by India

Ans Aryabhatta

III. True or False – If False give the correct answer

1. **On a full Moon day, when the Sun is setting in the west, Moon rises in the West.**

Ans. **False. Correct statement :** On a full Moon day, when the Sun is setting in the west, Moon rises in the **East**.

2. **The word crescent refers to the phases where the Moon is less than half illuminated.**

Ans. **True.**

3. **Galilio accepted the Geo-centric model.**

Ans. **False. Correct statement :** Galilio **did not** accepted the Geo-centric model.

4. **Our Milky Way galaxy is identified as an elliptical galaxy.**

Ans. **False. Correct statement :** Our Milky Way galaxy is identified as an **spiral** galaxy.

5. **The planet Venus in our solar system doesn't have a Moon.**

Ans. **True**

IV. Match the following:

1.	Rohini	GSLV-Mark III
2.	GSAT-14	GSLV Mark III D1
3.	GSAT-19	SLV-3
4.	Chandrayaan-2	PSLV-XL C25
5.	Mangalyaan	GSLV-D5

Ans.

1.	Rohini	SLV-3
2.	GSAT-14	GSLV-D5
3.	GSAT-19	GSLV Mark III D1
4.	Chandrayaan-2	GSLV-Mark III
5.	Mangalyaan	PSLV-XL C25

V. Analogy:

1. **Older stars : elliptical galaxies :: younger stars :_____ .** Ans **Irregular galaxies.**

2. **Nearest galaxy : Andromeda :: Nearest star :_____ .** Ans **Alpha Centauri.**

VI. Very short answer:

1. **The word _____ refers to the phases where the Moon is less than half illuminated (cresent / gibbous)**

Ans. cresent.

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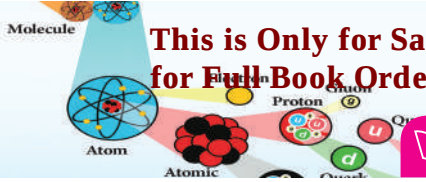

2. **_____ and _____ planets never appear in the mid-night sky.**

Ans. Mercury, Venus.

3. **Number of days taken by the Mars to orbit around the Sun.**

Ans. 687 days.

4. **In which phase does the size of the planet Venus is small?**

Ans. When it was in Gibbous phase.

5. **The only evidence of the big bang theory is**

Ans. The only evidence of the big bang theory is a faint glow in space, called cosmic microwave background.

6. **The galaxy which contains abundant amount of gas and dust is _____?**

Ans. Spiral galaxy.

7. **Which country launched the world's first artificial launch vehicle?**

Ans. Russia launched the world's first artificial launch vehicle.

VII. Short Answer Questions:

1. **What is epicyclic model?**

Ans.
(i) To explain the puzzling phenomena astronomers in early times proposed a change in the simple geocentric model. This is called as epicycle model.
(ii) A small circle whose centre is on the circumference of a larger circle, in ptolemic astronomy.
(iii) It was seen as the basis of revolution of the seven plants, given a fixed central Earth.

2. **Name the four different types of Galaxies.**

Ans.
(i) Spiral galaxy.
(ii) Elliptical galaxy
(iii) Irregular galaxy
(iv) Barred spiral galaxy

3. **What is constellation?**

Ans. A constellation is a recognizable pattern of stars in the night sky when viewed from the Earth.

4. **Give the expansions of PSLV and GSLV.**

Ans. **PSLV :** Polar Satellite Launch Vehicle.

GSLV : Geosynchronous Satellite Launch Vehicle.

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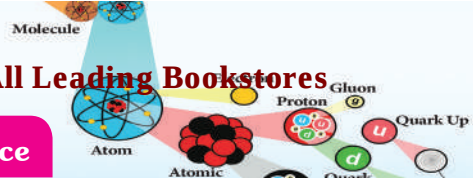
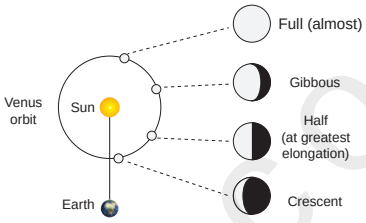


VIII. Answer in Detail:

1. Explain the waxing and waning phases in Venus.

Ans.

(i) As the Venus went around the epicycle, as shown in the diagram Venus would exhibit phases.



(ii) Also at times the planet would be nearer, making the apparent size grow bigger and at times far making the apparent size smaller.

(iii) If the Venus was going around the Sun, and its orbit is inside that of Earth, Venus would appear always near the Sun in the sky.

(iv) It can never be seen in the midnight sky. Two when it is near the Earth, it would be brighter and bigger compared to when it is on the other side of the Sun.

(v) Thirdly only if the Venus is revolving around the Sun, it can exhibit gibbous phase, and the size of the gibbous phase smaller than the crescent phase.

(vi) If the Venus was revolving around the Earth, we can never see the gibbous phase of the Venus and it would be seen only if it is orbiting the Sun.

2. Write short notes on constellations.

Ans.

(i) A constellation is a recognizable pattern of stars in the night sky when viewed from the Earth.

(ii) International Astronomical Union has classified 88 constellations to cover the entire celestial sphere.

(iii) Many of the old constellations have Greek or Latin names and are often named after mythological characters.

(iv) Ursa Major (Saptha Rishi Mandalam) is a large constellation and it covers a large part of the sky.

(v) The most striking feature of this constellation is a group of seven bright stars known as big dipper (seven Sages in Indian astronomy).

(vi) Ursa Minor in Lattin means 'the little bear' it lies in the northern sky.

(vii) The Pole star – Polaris (Dhrua) lies within this constellation.

(viii) The main group, 'little dipper', consists of seven stars and is quite similar to that found in Ursa Major.

IX. HOT Question:

1. Neelan and Mala are having a conversation about our Universe. Neelan is telling our Earth will be the only planet in the entire Universe to have a life with. But, Mala is opposing his view by citing certain points. What would be the argument of Mala? Do you support Mala? Justify your stand.

Ans. I would like to support Neelan, because Life is possible only on the Earth due to presence of water, oxygen, various gases and suitable temperature, which enables us to live.

Mala opposed Neelan's view based on the following points :

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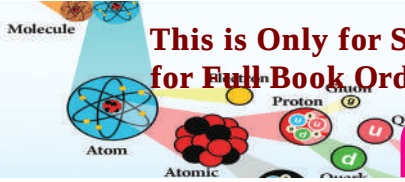

(i) Like the Sun, there might be billions of other stars with their own planets revolving around them.

(ii) Thus there are many chances of any planet getting the suitable conditions for supporting life.

Additional Questions

I. Choose the correct answer.

1. What type of galaxy is the milky way?

(a) Spherical (b) Irregular
(c) Spiral (d) Elliptical

Ans (c) Spiral

2. Stars mainly consists of _____.

(a) Oxygen and hydrogen (b) hydrogen and helium
(c) Oxygen and nitrogen (d) Carbon and helium

Ans (b) hydrogen and helium

3. The Great Bear or Saptha Rishi Mandalam are the names of

(a) The Ursa Major (b) Orion
(c) Both a and b (d) None of these

Ans (a) The Ursa Major

4. GSLV means _____.

(a) Global Satellite Locus Verification
(b) Geostationary Satellite Launch Vehicle
(c) German Satellite Launching Vehicle
(d) None of these

Ans (b) Geostationary Satellite Launch Vehicle

5. Parsec is equal to _____

(a) 2 light years (b) 5 light years
(c) 4.56 light years (d) 3.26 light years

Ans (d) 3.26 light years

6. The hottest planet in the solar system is _____

(a) Mercury (b) Venus
(c) Sun (d) Mars

Ans (b) Venus

7. The first artificial satellite is _____

(a) Sputnik - I (b) Sputnik - II
(c) Apollo - II (d) Vostok

Ans (a) Sputnik - I

8. The nearest galaxy to our Milky way is _____

(a) Andromeda (b) Proxima centauri
(c) Large megallanic cloud (d) None of these

Ans (a) Andromeda

9. Earth orbit around Sun in _____ days.

(a) 465 (b) 365 (c) 687 (d) 24

Ans (b) 365

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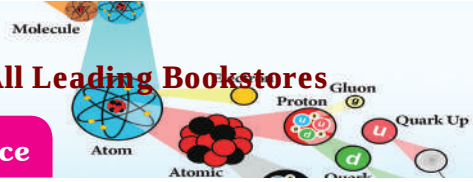

10. **According to Big Bang theory, space and time emerged together about _____ billions of years ago.**

(a) 20 (b) 24 (c) 14 (d) 50 **Ans (c) 14**

II. Fill in the blanks.

1. _____ is commonly defined as the totality of everything that exists or is known to exist. **Ans Universe**

2. At all times one half of _____ is illuminated by Sun and the opposite side is shroud in darkness. **Ans Moon**

3. The reversal of direction of planets is called as **Ans retrograde motion**

4. Telescope was invented by _____ but Galilio used it for studying the sky for the first time. **Ans Hans Lippershey**

5. To naked eye, _____ is just a gleaming bright spot. **Ans Venus**

6. The event when the matter confined in a single point and began to expand is called _____. **Ans 'big bang'**

7. The distance travelled by light in one year is called a _____. **Ans light year**

8. The average distance between the Earth and the Sun is called an _____. **Ans astronomical unit**

9. The diameter of Milky Way is over _____ light years. **Ans 100,000**

10. The solar system travels at an average speed of _____. **Ans 828,000 km/h**

11. ISRO built India's first satellite, _____, which was launched by the Soviet Union on 19 April 1975. **Ans Aryabhatta**

III. True or False - If false, give the correct statement.

1. **On the full Moon day, when the Sun is setting in west, at the same time, Moon rises at the west.**

Ans. **False**. **Correct statement :** On the full Moon day, when the Sun is setting in west, at the same time, Moon rises at the **east**.

2. **Moon going around Earth with 27 days period.**

Ans. **True**.

3. **The word gibbous refers to phases where the Moon is more than half illuminated.**

Ans. **False**. **Correct statement :** The word **crescent** refers to phases where the Moon is more than half illuminated.

4. **Kepler found that his observation of Venus gave the observational evidence to support the heliocentric theory.**

Ans. **False**. **Correct statement :** **Galileo** found that his observation of venus gave the observational evidence to support the heliocentric theory.

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5. **All the galaxies are appearing to move away from us.**

Ans. **True**.

6. **Solar system is located, is classified as a barred spiral galaxy.**

Ans. **True**.

7. **Unlike galaxy, constellations are more optical appearance and not real objects.**

Ans. **True**.

8. **All planets except mercury in our solar system have Moons.**

Ans. **False**. **Correct statement :** All planets except mercury and **venus** in our solar system have Moons.

9. **The vision of ISRO is to harness space technology for national development while pursuing space science research and planetary exploration.**

Ans. **True**.

10. **NASA sent a lunar orbiter, Chandrayan - 1 on 22 October- 2008.**

Ans. **False**. **Correct statement :** **ISRO** sent a lunar orbiter, Chandrayan - 1 on 22 October-2008.

IV. Match the following :

1.

1.	Galileo Galilei	(a)	Earth is at the centre
2.	Heliocentric theory	(b)	Dr. A.P.J. Abdul Kalam
3.	Geo-centric theory	(c)	Jupiter - bound space probe
4.	Missile man of India	(d)	Sun is at the centre

Ans (1-c, 2-d, 3-a, 4- b)

2.

1.	Ursa Minor	(a)	Hunter
2.	Ursa Major	(b)	Dhruva
3.	Orion	(c)	Big dipper
4.	Pole star	(d)	Little bear

Ans (1-d, 2-c, 3-a, 4- b)

3.

1.	Spiral galaxy	(a)	Globular clusters
2.	Elliptical galaxy	(b)	Bar-shaped structure
3.	Irregular galaxy	(c)	Young, hot stars
4.	Barred spiral galaxy	(d)	Abundant amount of gas, dust

Ans (1-c, 2-a, 3-d, 4- b)

V. Very short Answers:

1. **Name the planets which have no Moon.**

Ans. Mercury and Venus.

2. **Name the galaxy in which we live.**

Ans. Milky way.

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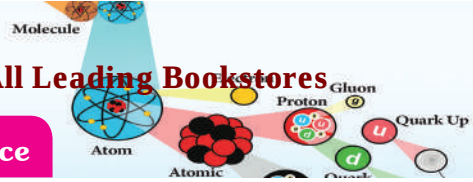

3. Name the star that appears to be stationary in the night sky.

Ans. Pole star.

4. What is the Indian name of Ursa Minor?

Ans. Laghu Saptarishi.

5. Name the planets which have more than 60 Moons.

Ans. Jupiter and Saturn.

6. What is the distance of our solar system from the centre of the galaxy?

Ans. 27,000 light years.

7. What is the distance that light travels in one year called?

Ans. Light year.

8. The constellation Big dipper is known by another name also. What is it?

Ans. Ursa Major.

9. What are constellations?

Ans. Constellations are stars that appear to form a pattern when viewed from the Earth.

VI. Short Answer.

1. Why does the Moon changes its shape daily?

Ans. Moon changes its shape daily because, it revolves around the Earth and the light from the Sun continuously changes due to the presence of Earth between Moon and the Sun.

2. What is first quarter?

Ans.
(i) When the Sun, Earth and Moon are in 90 degree angle.
(ii) Half if it illuminated and half is dark side.
(iii) The Moon will appear as half Moon.
(iv) The half Moon during the waxing period is called as first quarter

3. Write a note on planet.

Ans.
(i) Planets are heavenly bodies that revolve around the Sun.
(ii) They do not give out light of their own.
(iii) Their surface reflects the light of the Sun to us.

4. Write a note on ISRO.

Ans.
(i) The Indian Space Research Organisation (ISRO) is the space agency of the Government of India headquartered in the city of Bangalore.
(ii) Its vision is to "harness space technology for national development while pursuing space science research and planetary exploration."

5. Why Earth is called a unique planet?

Ans.
(i) Earth is unique because it is the only planet on which life is known to exist.
(ii) The presence of atmosphere, water and suitable temperature make life possible here.

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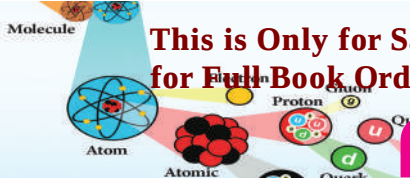

6. Write a note on artificial satellites.

Ans.
(i) Artificial satellites are man-made objects placed in an obit to rotate around a planet – usually the Earth.
(ii) The world's first artificial satellite launched was Sputnik-1by Russia, Aryabhatta was the first satellite launched by India.
(iii) These satellites are used in television and radio transmission, studying agriculture yield, locating mineral resources, weather forecasting, locate different places on Earth.

7. Stars appear to twinkle. Give reason.

Ans.
(i) The stars are remotely located and appear as tiny dots of light.
(ii) Their light travels long distances to reach us.
(iii) The atmosphere disturbances do not allow light to reach us in a straight line path.
(iv) Because of this the stars appear to twinkle.

VII. Long Answer:

1. Explain about the origin of the universe.

Ans.
(i) All the galaxies were appearing to move away from us. Further, farther they are faster they appear to move.
(ii) Cosmologists, scientists who study the structure and evolution of universe that is cosmos, reason that this imply at one point of time in the past all matter was confined in a single point and since then it has started to expand.
(iii) The event when the matter confined in a single point and began to expand is called 'big bang'.
(iv) This is considered as the origin of our universe as we know it.
(v) The Big Bang Theory is the prevailing model of the evolution of the Universe.
(vi) Under this theory, space and time emerged together about 14 billions of years ago.
(vii) At that time, the entire Universe was inside a bubble that was thousands of times smaller than a pinhead.
(viii) It was hotter and denser than anything we can imagine.
(ix) Then it suddenly expanded. The present Universe emerged.
(x) Time, space and matter all began with the Big Bang.

VIII. Creative questions: HOTS

1. Do stars emit light only during night?

Ans. No. Stars emit light all the time. But we are not able to see their light due to excess brightness of the Sun.

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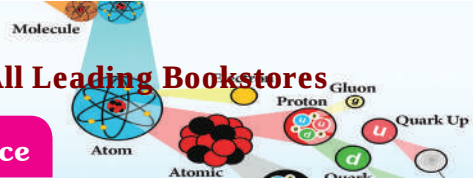
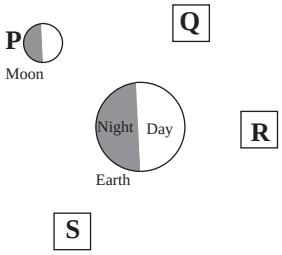


2. **In the given picture out of the positions P, Q, R and S which will indicate the position of the Sun. Draw the Sun at the appropriate position.**



Ans. Sun will be at position R.

3. **We never see the backside of the Moon from the Earth. Is it true?**

Ans. Yes, as the Moon revolves around the Earth facing one part of the Moon towards the Earth, then we never see back side of the Moon from the Earth.

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UNIT TEST

Time : 60 min. **Marks : 25**

I. Choose the correct answer: (3 × 1 = 3)

1. **The Galaxy containing young and hot stars is**

(a) elliptical galaxy (b) irregular galaxy
(c) cluster (d) spiral galaxy

2. **With the launch of this satellite, ISRO became capable of launching 4 ton heavy satellites**

(a) GSAT- 13 (b) GSAT- 14
(c) GSAT- 17 (d) Way par GSAT- 19

3. **The nearest galaxy to our Milky way is _____**

(a) Andromeda (b) Proxima centauri
(c) Large megallanic cloud (d) None of these

II. Fill in the blanks. (4 × 1 = 4)

4. _____ is the prevailing model of Evolution of the Universe.

5. _____ is the first satellite launched by India

6. To naked eye, _____ is just a gleaming bright spot.

7. The diameter of Milky Way is over _____ light years.

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III. True or False - If false, give the correct statement. **(3 × 1 = 3)**

8. On a full Moon day, when the Sun is setting in the west, Moon rises in the West.
9. The planet Venus in our solar system doesn't have a Moon.
10. Kepler found that his observation of Venus gave the observational evidence to support the heliocentric theory.

IV. Give very short answer: **(3 × 1 = 3)**

11. The only evidence of the big bang theory is _____
12. Number of days taken by the Mars to orbit around the Sun.
13. Name the planets which have more than to Moons.

V. Give short answer: **(2 × 2=4)**

14. Why does the Moon changes its shape daily?
15. Name the four different types of Galaxies.

VI. Answer the following in detail: **(2 × 4 = 8)**

16. Write short notes on Constellations.
17. Explain about the origin of the Universe.

Answer Key

I. 1. (d) spiral galaxy 2. (d) Way par GSAT- 19 3. (a) Andromeda

II. 4. The Big Bang Theory 5. Aryabhatta 6. Venus
7. 100,000

III. 8. False. Correct statement : On a full Moon day, when the Sun is setting in the west, Moon rises in the East.
9. True
10. False. Correct statement : Galileo found that his observation of venus gave the observational evidence to support the heliocentric theory.

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12. Refer Sura's Guide Text Book Q. No. VI - 3.
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