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Preface

Welcome to Dolphins Science Notes !

This compilation is designed to serve as a comprehensive resource for students, educators and enthusiasts alike who are eager to explore the wonders of science. This guide has been meticulously crafted to provide clarity, insight and a deeper understanding of various scientific concepts across different disciplines.

Whether you're delving into physics, chemistry, biology and computer science or any other branch of science, I hope this guide will serve as a valuable companion on your journey of discovery. Enjoy the exploration!

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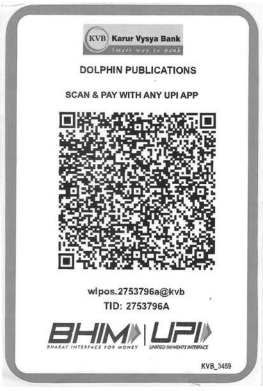

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Table Of Contents

UNIT 1

MEASUREMENT

Learning Objectives

XBZVR

After completing this lesson, students will be able to

- understand the fundamental and derived quantities and their units.
- know the rules to be followed while expressing physical quantities in SI units.
- get familiar with the usage of scientific notations.
- know the characteristics of measuring instruments.
- use Vernier caliper and screw gauge for small measurements.
- find the weight of an object using a spring balance.
- know the importance of accurate measurements.

Textbook Exercises

PAGE - 11

I. CHOOSE THE CORRECT ANSWER

1. Choose the correct one.

a) mm< cm < m < km b) mm > cm > m > km

c) km < m < cm < mm d) mm > m> cm> km **[a) mm< cm < m < km]**

---

2. Rulers, measuring tapes and metre scales are used to measure

a) mass b) weight c) time d) length [**d) length]**

---

3. 1 metric ton is equal to

a) 100 quintals b) 10 quintals c) 1/10 quintals d). 1/100 quintals

[b) 10 quintals]

---

4. Which among the following is not a device to measure mass?

a) Spring balance b) Beam balance c) Physical balance d) Digital balance

[a) Spring balance]

II. FILL IN THE BLANKS

1. Metre is the unit of _____ **[Length]**

2. 1 kg of rice is weighed by _____ **[Common beam balance]**

3. Thickness of a cricket ball is measured by _____ **[vernier caliper]**

4. Radius of a thin wire is measured by _____ **[screw gauge]**

5. A physical balance measures small differences in mass up to _____ **[1 milligram]**

III. STATE WHETHER TURE OR FALSE. IF FALSE, CORRECT THE STATEMENT

1. The SI unit of electric current is kilogram.

Ans : False.

Correct Statement : The Si unit of electric current is **ampere**

2. Kilometre is one of the SI units of measurement.

Ans : False.

Correct Statement : Metre is one of the SI units of measurement

3. In everyday life, we use the term weight instead of mass.

Ans : True

4. A physical balance is more sensitive than a beam balance.

Ans : True

5. One Celsius degree is an interval of 1K and zero degree Celsius is 273.15 K.

Ans : True

6. With the help of Vernier caliper we can have an accuracy of 0.1 mm and with screw gauge we can have an accuracy of 0.01 mm.

Ans : True

IV. MATCH THE FOLLOWING

	Column - I		Column - II
1	Length	a)	Kelvin
2	Mass	b)	metre
3	Time	c)	kilogram
4	Temperature	d)	Second

Answer	
b)	**metre**
c)	**Kilogram**
d)	**Second**
a)	**Kelvin**

	Column - I	Column - I	
1	Screw gauge	a)	Vegetables
2	Vernier caliper	b)	Coins
3	Beam balance	c)	Gold ornaments
4	Digital balance	d)	Cricket ball

Answer	
b)	**coins**
d)	**cricket ball**
a)	**vegetables**
c)	**Gold ornaments**

V. ASSERTION AND REASON TYPE QUESTIONS.

Mark the correct answer 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 scientifically correct expression is " The mass of the bag is 10 kg"
   Reason (R) : In everyday life, we use the term weight instead of mass.
   [a) Both A and R are true but R is not the correct reason]

2. **Assertion (A)** : 0 °C = 273.16 K. For our convenience we take it as 273 K after rounding off the decimal.
   Reason (R) : To convert a temperature on the Celsius scale we have to add 273 to the given temperature.
   [b) Both A and R are true and R is the correct reason]

3. **Assertion (A)** : Distance between two celestial bodies is measured in terms of light year.
   Reason (R) : The distance travelled by the light in one year is one light year.
   [b) Both A and R are true and R is the correct reason]

VI. ANSWER VERY BRIEFLY

1. **Define measurement.**
   - It is defined as the determination of the size or magnitude of a quantity.

2. **Define standard unit.**
   - It is defined as a specific magnitude of a physical quantity that has been adopted by law or convention.

3. **What is the full form of SI system?**
   - International System of Units is the full form of SI system.

4. **Define least count of any device.**
   - The smallest length which can be measured by metre scale is called least count.

5. What do you know about pitch of screw gauge?

- The distance moved by the tip of the screw for one complete rotation of the head.It is equal to 1 mm in typical screw gauges.

6. Can you find the diameter of a thin wire of length 2 m using the ruler from your instrument box?

- We can't find the diameter of a thin wire using the ruler from our instrument box.

VII. ANSWER BRIEFLY

1. Write the rules that are followed in writing the symbols of units in SI system.

- The units named after scientists are not written with a capital initial letter. E.g. newton, henry.
- The symbols of the units named after scientists should be written by the initial capital letter. E.g. N for newton, H for henry.
- Small letters are used as symbols for units not derived from a proper noun. E.g. m for metre, kg for kilogram.
- No full stop or other punctuation marks should be used within or at the end of symbols. **Eg.** 50m and not as 50 m.
- The symbols of the units are not expressed in plural from. **Eg.** 10 kg not as 10 kgs.

2. Write the need of a standard unit.

- Earlier, different unit systems were used by people from different countries.
- Standard unit is convenient to use by everyone, everywhere.
- We need standard unit to measure the quantities accurately.

3. Differentiate mass and weight.

Sl. No.	Mass	Weight
1.	It is a fundamental quantity	It is a derived quantity
2.	It is a scalar quantity	It is a vector quantity
3.	Remains the same everywhere	Varies from place to place
4.	It is measured using physical balance	It is measured using spring balance
5.	Its unit is kilogram	It's unit is newton.

4. How will you measure the least count of Vernier caliper?

- In vernier caliper the main scale division will be in centimeter, further divided into millimetre.
- The value of the smallest main scale division is 1 mm.
- In the Vernier scale there will be 10 divisions.

$$\text{L. C} = \frac{\text{Value of one main scale division}}{\text{Total number of vernier scale division}}$$

$$\text{L. C} = \frac{1\text{ mm}}{10}$$

$$= \mathbf{0.1mm}$$

VIII. ANSWER IN DETAIL

1. Explain a method to find the thickness of a hollow tea cup.

- The Pitch, Least count and the type of zero error of the screw gauge are determined.
- The given cup is placed in between two studs.
- The head screw using the ratchat arrangement is freely rotated until the given cup is held firmly, but not tightly.
- Pitch scale reading (PSR) by the head scale and head scale coincidence (HSC) with the axis of the pitch scale, are found.
- The readings are recorded and the experiment for different positions of the given cup is repeated.
- The thickness of the cup is calculated using the formula P.S.R+ (HSC × L.C)
- Then the average of the last column of the table is found.
- Hence the thickness of a hollow tea cup = _____ mm.

2. How will you find the thickness of a one rupee coin?

- The Pitch, Least count and the type of zero error of the screw gauge are determined.
- The given coin is placed in between two studs.
- The head screw using the ratchat arrangement is freely rotated until given one rupee coin is held firmly, but not tightly.
- Pitch scale reading (PSR) by the head scale and head scale coincidence (HSC) with are axis of the pitch scale are found.
- The reading are recorded and the experiment for different positions of the given coin is repeated.
- The thickness of the coin is computed using the formula P.S.R+ (HSC × L.C)
- Then the average of the last column of the table is found.

S.no	P.S.R (mm)	HSC (division)	CHSC = HSC ± ZC (division)	CHSR = CHSC×LC(mm)	Total Reading =PSR+ CHSR(mm)
1.					
2.					
3.					

IX. NUMERICAL PROBLEMS

1. Inian and Ezhilan argue about the light year. Inian tells that it is 9.46×10^{15} m and Ezhilan argues that it is 9.46×10^{12} km. Who is right? Justify your answer.

Solution:

Inian is correct

Light travels 3×10^8 m in one second or 3 Lakhs

kilometre in one second.

In one year we have 365 days.

The total number of second in one year is equal to $365 \times 24 \times 60 \times 60$

Distance travelled by light in 1 year = $(3.153 \times 10^7) \times (3 \times 10^8) = 9.46 \times 10^{15}$ m.

---

2. The main scale reading while measuring the thickness of a rubber ball using Vernier caliper is 7 cm and the Vernier scale coincidence is 6. Find the radius of the ball.

Solution:

MSR	=	7 cm
VC	=	6 cm
LC	=	0.1 mm = 0.01 cm
Diameter	=	DR = MSR + (VC × LC) = 7 + 0.06 cm
Diameter D	=	7.06 cm
Radius R	=	(D/2) = (7.06/2) = 0.035 m
The radius of the ball	=	0.0353 m.

---

3. Find the thickness of a five rupee coin with the screw gauge, if the pitch scale reading is 1 mm and its head scale coincidence is 68.

Solution :

PSR	=	$1\text{mm} = 1 \times 10^{-3}\text{m}$
HSC	=	68 cm
LC	=	$0.01\text{mm} = 0.01 \times 10^{-3}$ m
Total reading	=	PSR+ (HSC×LC)
∴ Thinkness of the five rupee coin	=	$1 \times 10^{-3} + (68 \times 0.01 \times 10^{-3})$ m
∴ Thinkness of the five rupee coin	=	$1.68 \times 10^{-3} = 1.68$mm

---

4. Find the mass of an object weighing 98 N.

Solution:

W	=	mg
W	=	98 N
g	=	9.8ms^{-2}
m	=	W/g
	=	(98/9.8)
	=	10kg.

PRACTICALS

PRACTICAL - TABLE OF CONTENTS

1. To find the Diameter of a spherical body

Aim :

To determine the diameter of a spherical body using Vernier Caliper.

Apparatus required :

Vernier Caliper, given spherical body (cricket ball).

Formula:

(i) Least count (LC) = l Main scale division - 1 Vernier scale division .

LC = lmm - 0.9 mm

LC = 0.1 mm (or) 0.01 cm

(ii) Diameter of the spherical object (d) = M.S.R. + (VC x LC) ± ZC cm

MSR - Main Scale Reading VC - Vernier Coincide

LC - Least Count. (0.01 cm) ZC - Zero Correction.

Procedure :

- The least count of the Vernier caliper is found.
- The zero correction of the Vernier caliper is calculated.
- The object is firmly fixed in between the two lower jaws.
- The main scale reading and the Vernier scale coincidence are measured.
- The experiment is repeated by placing the jaws of the Vernier at different position of the object.

Least count (LC) = O.Olcm. Zero correction = 0

S.NO	Main Scale Reading (MSR) cm	Vernier Coincide vc	Diameter of object (d) = M.S.R. + (VC x LC)± ZC mm
1	7.4	4	= 7.4 + (4 x 0.01) + 0 = 7.44
2	7.4	5	= 7.4 + (5 x 0.01) + 0 = 7.45
3	7.4	6	= 7.4 + (6 x 0.01) + 0 = 7.46

Average = $\frac{7.44+7.45+7.46}{3} = \frac{22.35}{3}$ 7.45 cm

Report:

The diameter of the given spherical object (cricket ball) is = **7.45 cm (or) x 7.45 × 10^{-2} cm**

VIRUDHUNAGAR DISTRICT

Common Annual Examination 2024

Time : 2.30 Hours **Marks : 75**

Part – I

i) Answer all the questions: **12x1=12**

ii) Choose the most suitable answer

1) 1 metric ton is equal to

a) 100 quintals b) 10 quintals c) 1/10 quintals d) 1/100 quintals

2) Clouds float in atmosphere because of their low _____

a) density b) pressure c) velocity d) mass

3) The unit of magnetic flux density is

a) Weber b) Weber/metre c) Weber/meter^2 d) Weber.meter^2

4) When a beam of white light passes through a prism it gets

a) reflected b) only deviated c) deviated and dispensed

5) _____ has the same properties throughout the sample

a) pune substance b) mixture c) colloid d) Suspension

6) The cathode of an electrochemical reaction involves _____

a) Oxidation b) reduction c) neutralisation d) cantenation

7) Bond formed between a metal and non metal is usually _____

a) Ionic bond b) Covalent bond c) Coordinate bond

8) Elements in the modern periodic table are arranged in _____ groups and _____ periods.

a) 7, 18 b) 18, 7 c) 17, 8 d) 8, 17

9) Water vascular system is found in

a) Hydra b) Earthworm c) Star fish d) Ascaris

10) Bile helps in the digestion of _____

a) proteins b) Sugar c) fats d) Carbohydrates

11) The physician who discovered that scurvy can be cured by ingestion of citrus fruits is _____.

a) James Lind b) Louis Pasteur c) Charles Darwin d) Isaac Newton

12) Which one of the following is an Italian species of honey bee?

a) Apis mellifera b) Apis dorsata c) Apis florae d) Apis cerana

Part – II

Answer any seven questions: (Q.No: 22 is compulsory) **7x2=14**

13) Define standard unit

14) Name any two appliances which work under the principle of heating effect of current.

15) Match the following

i) Alkaline Earth metal - Sodium
ii) Electric generator - Faraday
iii) Alkalimetal - induction
iv) Electro magnetic induction - Calcium
- Iron

16) Define sublimation

17) Write the electronic configuration of K and Cl

18) Mention any two vital functions of human kidney.

19) How does locomotion take place in starfish

20) Give abbreviations for the following.

a) ISI –
b) FSSAI –

21) What are the two factors of biosphere?

22) At an orbital height of 400 km, find the orbital period of the satellite.

Part – III

Answer any seven questions: (Q.No.32 is compulsory) **7x4=28**

23) Differentiate mass and weight.

24) List the safety features white handling electricity.

25) State Kepler's laws

26) Explain the postulates of Bohrs atomic model

27) Write any four uses of acids

28) List five characteristic of fishes

29) Explain the structure of nephron.

30) What are the sources of organic resources for vermi composting?

31) Explain the types of Transpiration.

32) Find the oxidation number of the elements in the following compounds.

a) C in CO_2 b) Mn in $MnSO_4$

Part – IV

Answer all the questions. **3x7=21**

(Draw diagram wherever necessary)

33) Explain different types of motion **(OR)**
Explain two types of transformer

34) Name various food additives and explain their functions. **(OR)**
Write the differences between elements and compounds and give an example

35) Give an account of classification of bacteria based on the shape. **(OR)**
Describe the processes involved in the water cycle.

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