Tech Exercise and CRQ

Chapter 1

1. Can a non-physical quantity be measured? If yes, then how?

No, a non-physical quantity cannot be measured **using tools and instruments. It can only be** described qualitatively or compared using predetermined criteria, indices, or survey techniques.

2. What is measurement? Name its two parts.

Measurement: **Measurement is a physical quantity having a** number and a unit**.**
Parts: **A measurement has** two parts: a number and a unit**, and without a unit it is meaningless.**

3. Why do we need a standard unit for measurements?

We need a **standard unit for measurement** to avoid confusion because measurements using body parts like hand, arm, foot or steps differ from person to person. It also helps scientists and countries **exchange scientific information and trade easily using the same units**.

4. Write the name of 3 base quantities and 3 derived quantities.

Base Quantities: i) Length ii) Mass iii) Time

Derived Quantities: i) Area ii) Volume iii) Speed

5. Which SI unit will you use to express the height of your desk?

In SI unit, we will use to express the height of our desk is metre (m).

6. Write the name and symbols of all SI base units.

Sr no	Name of physical quantity	Unit	Symbol
1	Length	Meter	M
2	Mass	Kilogram	Kg
3	Time	Second	S
4	Temperature	Kelvin	K
5	Electric current	Ampere	A
6	Intensity of light	Candela	Cd
7	Amount of substance	mole	Mol

7. Why prefix is used? Name three sub multiples and three multiple prefixes with their symbols.

Prefixes are used to simplify the representation of very large or very small quantities.

Submultiple of length		
1 milli metre	1mm	10^{-3}
1centi metre	1cm	10^{-2}
1micrometre	1µm	10^{2}

Submultiple of Mass		
1 kilogram	1kg	10^{3} m
1mega gram	1mg	10^{6} m
1giga gram	1Gg	10^{9} m

8. In SI unit, we will use to express the height of our desk is metre(m). What is meant by? (a) 5 pm (b) 15 ns (c) 6 µm (d) 5 fs

5 pm: 5 pm means **5 pico metre**, it is length i.e., 5×10^{-12} m.
(b) 15 ns: 15 ns means **15 nano seconds**, it is time i.e., 15×10^{-9} s.
(c) 6 μm: 6 μm means **6 micro metre**, it is length i.e., 6×10^{-6} m.
(d) 5 fs: 5 fs means **5 femto seconds**, it is time i.e., 5×10^{-15} s.

9. **For what purpose a Vernier Callipers is used?**

Vernier Callipers is an instrument used to measure small lengths up to 1/10th of a millimetre. It measures the thickness, diameter, width or depth of an object.

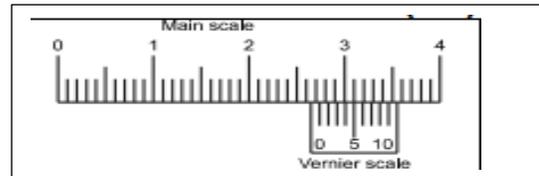**.** Two Main Parts:
(i) Main scale
(ii) Vernier scale

10. **State least count and Vernier scale reading as shown in the figure and hence, find the length.**

Least Count:
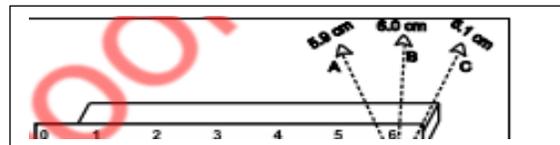Least count of Vernier Callipers = **1 M.S div − 1 V.S div = 1 mm − 0.9 mm = 0.1 mm (0.01 cm)**.

Length:
Length = **MSR + LC × VSR= 2.6 cm + 0.01 × 5**
= **2.6 cm + 0.05 cm**
= **2.65 cm**.

11. **Which reading out of A, B and C shows the correct length and why?**

In the figure, **reading B (6.0 cm)** is the correct length because the **eye is at the level of the scale** and **zero error is zero**.

CRQ

1. **In what unit will you express each of the following?**

a) Thickness of a five-rupee coin: **millimetre (mm)**	(e) Mass of a five-rupee coin: **gram (g)**
(b) Length of a book: **inch (in)**	(f) Mass of your school bag: **kilogram (kg)**
(c) Length of football field: **metre (m)**	(g) Duration of your class period: **minutes (min)**
(d) Distance between two cities: **kilometre (km)**	(h) Volume of petrol in a car tank: **litre (L)**
	(i) Time to boil one litre milk: **minutes (min)**

2. **Why might a standard system of measurement be helpful to a tailor?**
A standard system of measurement is helpful to a tailor because it **improves efficiency and reduces errors in garment sizes**. It helps the tailor **take accurate body measurements and make clothes that fit properly**.

3. **The minimum main scale reading of a micrometer screw gauge is 1 mm and there are 100 divisions on the circular scale. When thimble is rotated once, 1 mm is its**
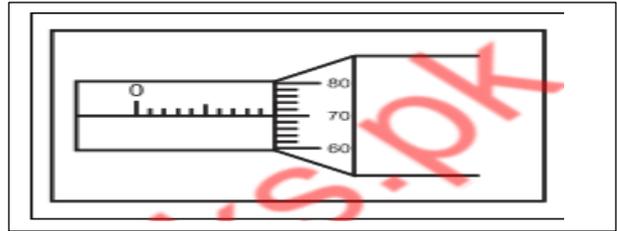
measurement on the main scale. What is the least count of the instrument? The reading for thickness of a steel rod as shown in the figure. What is the thickness of the rod?

Least count of micrometer screw gauge = **1 mm / 100 = 0.01 mm**

Main scale reading = **9 mm**

Circular scale reading = **70**

Thickness of the rod = **9 mm + (70/100) mm**
= **9 mm + 0.70 mm**
= **9.70 mm**.

4. **You are provided a metre scale and a bundle of pencils; how can the diameter of a pencil be measured using aas that of Vernier Callipers? Describe briefly**

Arrange several identical pencils in a row and measure their **total length (L)** with a metre scale.
Then divide the total length by the **number of pencils (n)** to find the diameter: **Diameter = L/n**.

5. **The end of a metre scale is worn out. Where will you place a pencil to find the length?**

If the end of a metre scale is worn out, align the pencil with a clear mark (e.g., 1 cm) and measure the other end.
Then subtract the starting mark from the final reading: **Length = Final reading − Starting reading**.

6. **Why is it better to place the object close to the metre scale?**

Place the object close to the metre scale to **minimize parallax error, use unworn sections, and get more accurate and precise measurements**.

7. **Why a standard unit is needed to measure a quantity correctly?**

A standard unit is needed to **measure quantities accurately** because it ensures **consistency, avoids confusion, allows comparison, and enables clear communication**.

8. **Suggests some natural phenomena that could serve as a reasonably accurate time standard**

Natural phenomena like **Earth's rotation, Earth's orbit, pendulum swings, atomic vibrations, and Moon's phases** provide **reliable and repeatable time intervals** for accurate time measurement.

9. **It is difficult to locate the meniscus in a wider vessel. Why?**

In wider vessels, the meniscus is harder to see because the liquid surface is flatter, reducing the effect of surface tension and increasing the chance of **parallax errors**.

10. **Which instrument can be used to measure: (1.5) (i) Internal diameter of a test tube. (ii) Depth of a beaker**

(i) A Vernier Callipers can measure the **internal diameter of a test tube** using its **vernier scale**.
(ii) It can also measure the **depth of a beaker** accurately because of the **vernier scale**.