

Q: How physics plays an important role in our life?

Physics plays an important role in our daily life. The devices we use on a regular basis like computer, smart phone, internet etc. and the devices like rocket, space shuttle, train and robots are all based on the principles of Physics.

The discoveries or inventions of electricity, wireless communication, X-rays, computers, automobiles etc. have affected our lives in a way that we no longer can imagine our life without the technologies developed using the medium of Physics.

Q: Estimate your age in minutes and seconds.

Let Age = 15 years

Age in days = $15 \times 365 = 5475$ days

Age in hours = $5475 \times 24 = 13,1400$ hours

a. Age in Minutes

Age in min = $13,1400 \times 60 = 78,84000$ minutes

Age in min = 7.884×10^6 minutes

b. Age in Seconds

Age in seconds = $78,84000 \times 60 = 77,3040000$ sec

Age in seconds = 7.7304×10^8 sec

Q: What base quantities are involved in these derived physical quantities; force, pressure, power and charge.

Quantities	Derived Unit	Involved Base quantities
Force	Kgms^{-2}	Mass, Length & Time
Pressure	$\text{Kgm}^{-1}\text{s}^{-2}$	Mass, Length & Time
Power	$\text{Kgm}^2\text{s}^{-2}$	Mass, Length & Time
Charge	As	Electric Current & Time

Q: Show that prefix micro is thousand times smaller than prefix milli.

$$\mu = 10^{-6}$$

$$\mu = 10^{-6} \times 10^{-3}/10^{-3}$$

$$\mu = 10^{-6} \times 10^3 \times 10^{-3}$$

$$\mu = 10^{-6+3} \text{ milli}$$

$$\mu = 10^{-3} \text{m}$$

$$\mu = 1/1000 \text{ m}$$

Q: Justify that displacement is vector quantity and energy is scalar quantity.

Displacement is a vector as it is completely describe by both magnitude and direction. It follows vector algebra. For example: A person walks **10m East** and **5m west**. We cannot say that **displacement is (15m)** as this quantity has **magnitude and direction** both. In order to get displacement (**resultant**) we need **vector algebra**.

Energy is a scalar quantity as it is completely describe by magnitude only. It follows ordinary algebra for addition. For example: A person walk from point "A" to "B" using 20 joules of energy and from "C" to "D" used **30 joules of energy**. The total energy used be (**20+30 = 50joules**).

Q: Screw gauge can give more precise length than vernier calipers. Briefly explain why?

As the least count of screw gauge is less than vernier caliper since it measure (least count = $1/100^{\text{th}}$ of millimeter) while vernier caliper can measure (least count = $1/10^{\text{th}}$ of millimeter). This means that it can measure length with greater precision. The instruments with less least count give more significant figures of measurements. More significant figures mean more precision.

Q: Differentiate between mechanical stop watch and digital stop watch.

Mechanical Stopwatch	Digital Stopwatch
It can show time interval on a circular dial with minutes and second hand.	It can show time interval in digital format on screen.
It can record time interval with less accuracy.	It can record time interval with more accuracy.
Its least count is 0.1 second.	Its least count is 0.01 second.
It cannot record split or lap- times.	It can record split or lap- times.

Q: How measuring cylinder is used to measure volume of an irregular shaped stone?

To measure the volume of an irregular shaped object (stone) we used measuring cylinder. To measure it we follow the following steps.

1. First take measuring cylinder, clean it and fill it with water.
2. Record the volume of water as initial volume (V_i).
3. Now tie the irregular stone with thread and immersed completely in measuring cylinder.
4. The volume of water rises, record this rise in volume as final volume (V_f).
5. To get the volume of irregular solid stone subtract final volume from initial volume. ($V = V_f - V_i$)

Q: What precaution should be kept in mind while taking measurement using measuring cylinder?

While taking measurements using measuring cylinder first we have to check measuring cylinder is clean & dry. There is no damage or leakage, place it on level surface and record the measurements at eye level by following these precautions we get accurate & precise measurement.

Q: How random error can be reduced?

Random errors are unpredictable and unconditional errors to reduce these errors it is better to take multiple of same measurements and find its mean (Average), For example. To measure the time taken for ten oscillations we find its mean by dividing the sum of these values (time) by ten.

Q: Why do we need to consider significant digits in measurements?

Significant figures are important for maintaining reliability and precision of measurements. By considering significant figures we can provide accurate and precise results of measurements by preventing errors. More significant figures mean more precision.

Q: Differentiate between precision and accuracy.

Precision	Accuracy
Precision is a measure of how close the measure values are to each other.	Accuracy is a measure of how close the measured value is to exact value.
It focuses on the consistency and reproducibility of measurement without considering whether results are close to exact value or not	It focuses on closeness of the average measured values to exact value without considering consistency and reproducibility of measurements.
Measurements can be precise but not necessarily accurate.	Measurements can be accurate but not necessarily precise.
It can be determined with several measurements.	It can be determined with single measurements.
Precision may be affected by random errors.	Accuracy may be affected by systematic errors.