RADIANT 2026

Physics

Measurements and Experimentation

Lecture - 06

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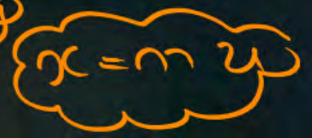
Topics *to be covered*

1. Derived Units of Some Physical Quantities
2. Guidelines for Writing the Units
3. Questions Practice

Recap *of previous lecture*

1. Measurement of Time
2. Simple Pendulum
3. Measurement of time period of a simple pendulum
4. Zero Error Vernier Callipers
5. Question's

CGIS
FPS
MKS
PQ

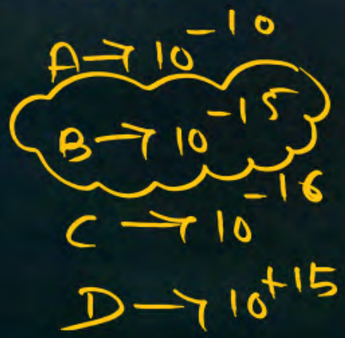


$U \propto \frac{1}{m}$

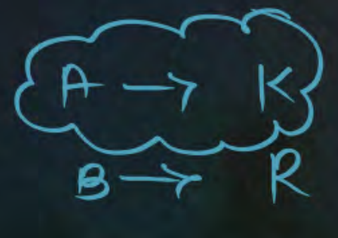
SI — Main, Supp

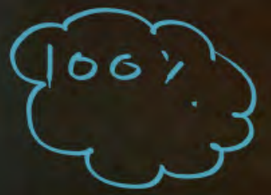
$\lambda \rightarrow$
$I \rightarrow$
$T \rightarrow$

If = ... m



SI Temp





C → °C

D → F

* FL of Second pendulum

A → 0.993

B → 0.994

B → 0.997

D → 0.991

Unit of time

A → Sec

Question

The least count of stop watch generally

A 1 s

B 1 min

C 0.5 s

D 1 h

Question

The least count of stop watch generally

(A) 1 s

(B) 1 min

(C) 0.5 s

(D) 1 h

ANSWER

(C) 0.5 s

Question

Find the order of magnitude of mass of Pluto if its radius is 10^6 m and average density is 10^3 kg/m^3

(A) 10^{12} Kg

(B) 10^{21} kg

(C) 10^{30} Kg

(D) Not

Question

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(B) 10^{21} kg

(C) 10^{30} Kg

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ANSWER

(B) 10^{21} kg

Question

Which among the following instruments is most accurate?

(A) Screw gauge 0.001 cm

(B) Vertices caliper 0.01 cm

(C) Metre scale → 0.1 cm

(D) Meanining tape

Question

Which among the following instruments is most accurate?

(A) Screw gauge

(B) Vertices caliper

(C) Metre scale

(D) Meanining tape

ANSWER

(A) Screw gauge

Question

Find the least count of a screw gauge whose head scale is divided into 100 division and moves 10 mm for 10 rotations of the head

(A) 0.1 mm

(B) 1 mm

(C) 0.001 cm

(D) 1 cm

Question

Find the least count of a screw gauge whose head scale is divided into 100 division and moves 10 mm for 10 rotations of the head

(A) 0.1 mm

(B) 1 mm

(C) 0.001 cm

(D) 1 cm

ANSWER

(C) 0.001 cm

Question

If the length of second pendulum on a planet is 2 m, then the acceleration due gravity on the surface of the planet is

(A) $9.8\ m/s^2$

(B) $19.6\ m/s^2$

(C) $2\pi^2\ m/s^2$

(D) $4\pi^2\ m/s^2$

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ANSWER

(C) $2\pi^2\ m/s^2$

Question

A cube has an edge of length 5 cm. Calculate its volume in Sl units.

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cm → CGS

m → SI

$5\,cm = 5 \times 10^{-2}\,m$

$Volume = l \times b \times h$

$= l^3$

$= 5 \times 10^{-2} \times 5 \times 10^{-2} \times 5 \times 10^{-2}$

$= 125 \times 10^{-6}$

$= 1.25 \times 10^{2} \times 10^{-6}$

$= 1.25 \times 10^{-4}\,m^3$

Solution:

Edge = 5 cm = 0.05 m

Volume = side^3 = $(0.05)^3$

= 1.25×10^{-4} m^3

Answer: 1.25×10^{-4} m^3

$\frac{Km}{hr}$

~~SI~~

$\frac{1\ Km}{1\ hr} = \frac{1000\ m}{60 \times 60\ sec}$

$= \frac{5}{18}$

$\frac{Km}{1\ hr} \xrightarrow{5/18} \frac{m}{sec}$

$\xleftarrow{18/5}$

Question

Convert 2 hours 30 minutes into seconds.

$2 \times 60 \times 60 = 7200$

$30 \times 60 = 1800$

9000 Sec

Question

Convert 2 hours 30 minutes into seconds.

Solution:

2 hours = 2 × 3600 = 7200 seconds

30 minutes = 30 × 60 = 1800 seconds

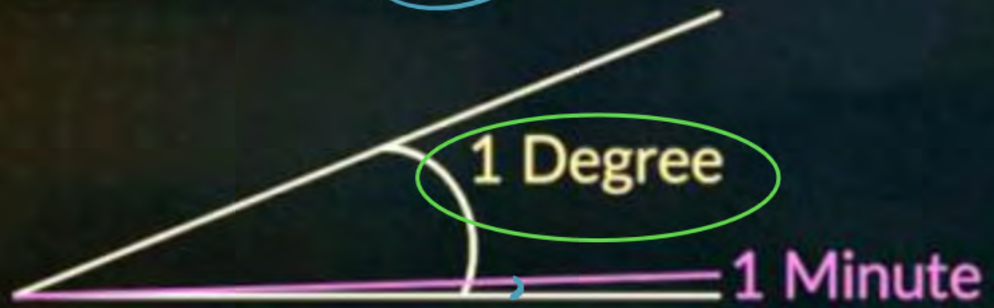
Total time = 7200 + 1800 = 9000 seconds

Answer: 9000 seconds

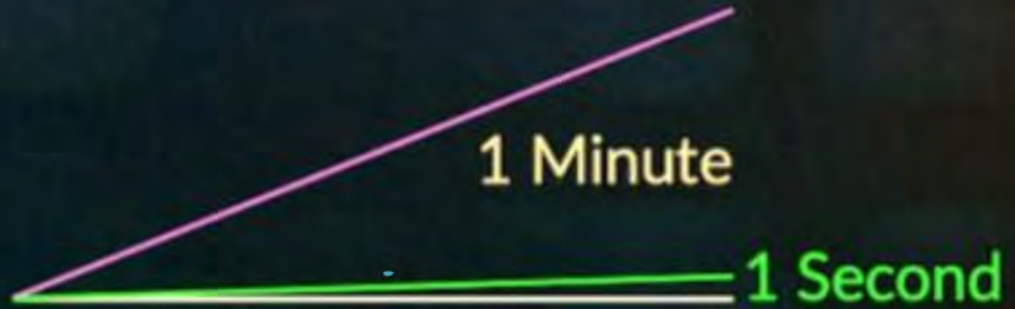
Converting Degrees to Minutes and Seconds

1 Degree = 60 Minutes

60

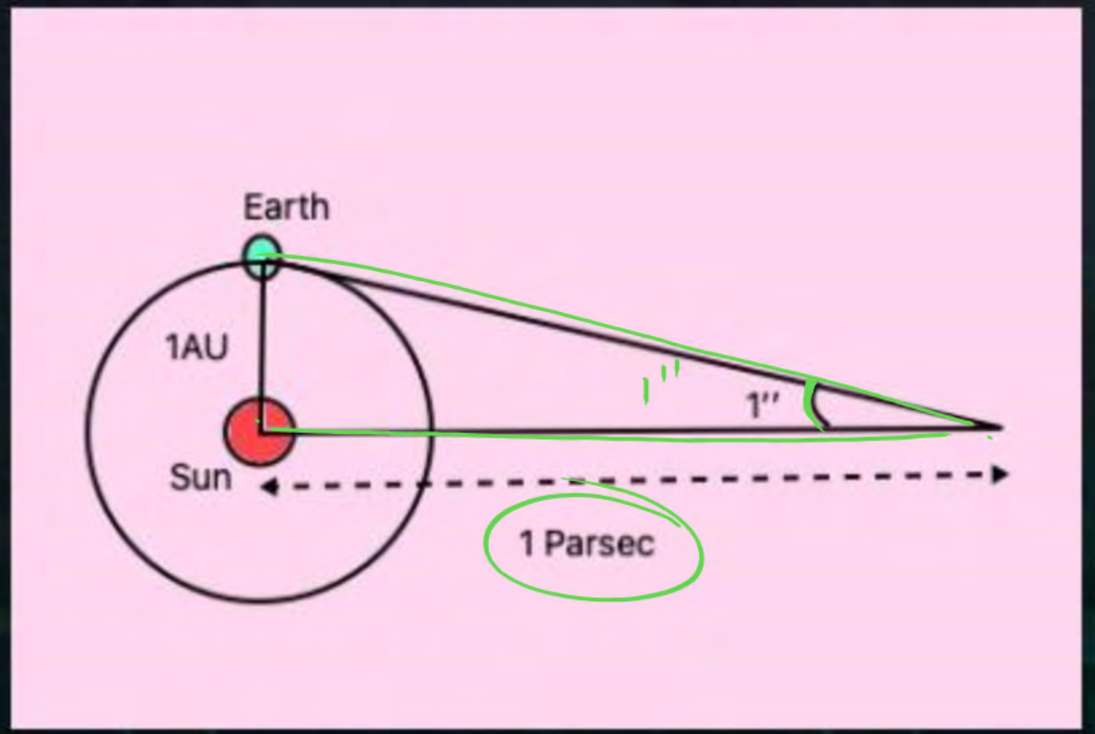


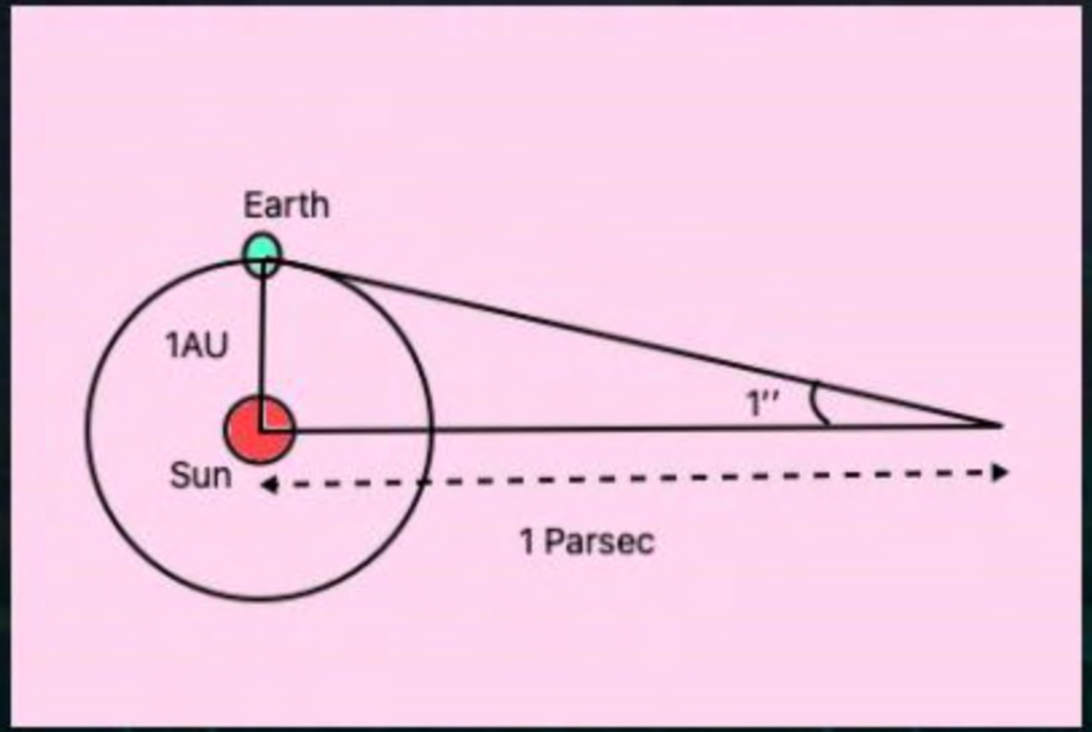
1 Minute = 60 Seconds



Basic Conversions

- 1 degree= 60 minutes — 1° = 60'
- 1 minute = 60 seconds — 1'=60"
- 1 degree = 3600 seconds — 1° = 3600"


Earth
1AU
Sun
1''
1''
1 Parsec


Earth
1AU
1''
Sun
1 Parsec

Guidelines for Writing the Units

Conventionally following rules are observed while writing the unit of a physical quantity:

(i) The symbol for a unit, which is not named after a scientist, is written in small letter. For example, symbol for metre is m, for second is s, for kilogram is kg and so on.

(ii) The symbol for a unit, which is named after a scientist, is written with first letter of his name in capital. For example, N for newton, J for joule, W for watt, Pa for pascal, Hz for hertz, C for coulomb and V for volt.

Guidelines for Writing the Units

(iii) The full name of the unit, irrespective of the fact whether it is named after a scientist or not, is always written with a lower initial letter e.g., unit for mass is written as kilogram, not as Kilogram; unit of length is written as metre, not as Metre; unit of force is written as newton and not as Newton ; unit of energy is written as joule and not as Joule; unit of power is written as watt and not as Watt.

(iv) A compound unit formed by multiplication of two or more units is written after putting a dot, cross or leaving a space between the two symbols. For example, the unit of torque is written as N. m or N × m or Nm.

(v) Negative power is used for compound units, which are formed by dividing one unit by the other.

Guidelines for Writing the Units

Examples:

(1) The unit of velocity is $\frac{\text{metre}}{\text{second}}$. It is expressed as ms^{-1}.

(2) The unit of power is $\frac{\text{joule}}{\text{second}}$. It is expressed as Js^{-1}.

(vi) A unit in its short form is never written in plural.

For example, 10 metres can not be written as 10 ms, because ms would mean millisecond.

Guidelines for Writing the Units

(vii) To avoid powers of ten in the magnitude of a quantity, prefix can be used with its unit. But a unit must not be written with more than one prefixes. For example, instead of kMW, we must write GW.

(viii) When prefix is used with the symbol of unit, the prefix and symbol combined becomes the new symbol of the unit.

For example, km^3 means $(10^3\ m)^3 = 10^9\ m^3$; it does not mean $10^3\ m^3$.


Thank you