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Physics भौतिक विज्ञान



1. Unit & Measurement मात्रक और मापन

- ❑ मापन एवं मात्राएँ (Units & Measurements) – NCERT Class 11
- ❑ विमाएँ (Dimensions) – NCERT Class 11
- ❑ सदिश एवं अदिश राशि (Vector and Scalar Quantity) – NCERT Class 9, 11
- ❑ सरल मशीन (Simple Machine) – NCERT Class 6, 7, 9

Class 01

**Units and Dimensions
(इकाई और आयाम)**



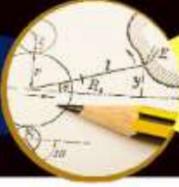


CHAPTER 2

UNITS AND MEASUREMENTS

2.1	Introduction	16
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Physical Quantities

भौतिक राशियाँ



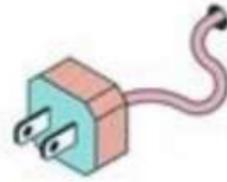
Metre



Kilogram



Second



Ampere



Mole



Kelvin



Candela

Nonphysical Quantities

अभौतिक राशियाँ





Physical Quantities

भौतिक राशियाँ

मापी जाने वाली राशियाँ

Measurable Quantities

- द्रव्यमान (Mass) → Kilogram (kg)
- समय (Time) → Second (s)
- विद्युत धारा (Electric Current) → Ampere (A)
- तापमान (Temperature) → Kelvin (K)

Nonphysical Quantities

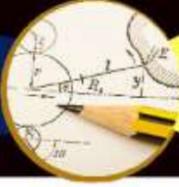
अभौतिक राशियाँ

माप नहीं सकते

(Non-measurable)

- प्रेम (Love)
- घृणा (Hatred)
- खुशी (Happiness)
- दुख (Sadness)
- भय (Fear)
- विश्वास (Trust)





Physical Quantities

भौतिक राशियाँ



मापी जाने वाली राशियाँ

Measurable Quantities

- द्रव्यमान (Mass) → Kilogram (kg)
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- विद्युत धारा (Electric Current) → Ampere (A)
- तापमान (Temperature) → Kelvin (K)

class - 01

Mon - Friday

↳ शाम 6pm

— Notes

— PDF

→ Complete - ebook

→ foundation Batch

→ 4 - 4 1/2 months

Nonphysical Quantities

अभौतिक राशियाँ



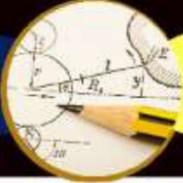
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- दुख (Sadness)
- भय (Fear)
- विश्वास (Trust)



नया



Concept

$$\text{मापन - Measurement} = \text{परिमाण} + \text{इकाई}$$

$$\text{Magnitude} + \text{unit}$$

Compare.

- Same unit
- Same magnitude X

संख्या
Numerical

$$A = \underbrace{5000}_{\text{परिमाण magnitude}} \underbrace{\text{gram}}_{\text{unit}}$$

50 km X 3 kg

Compare

4000 m 4 kg 4000 gram

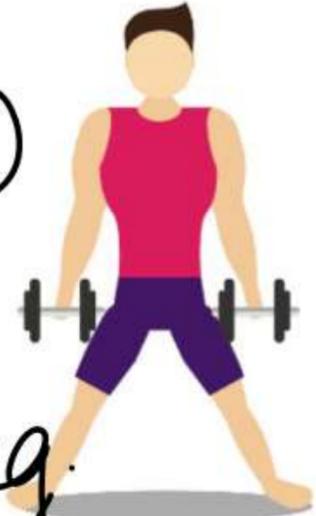


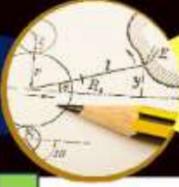
(A)

4 km
4000 m

(B)

4 kg
40 kg





$A = 10000 \text{ m}$

$B = 50 \text{ km}$

$B > A$

(A)



$A = 10,000 \text{ m}$
Number unit

$B = 3 \text{ km}$

$A > B$

(B)

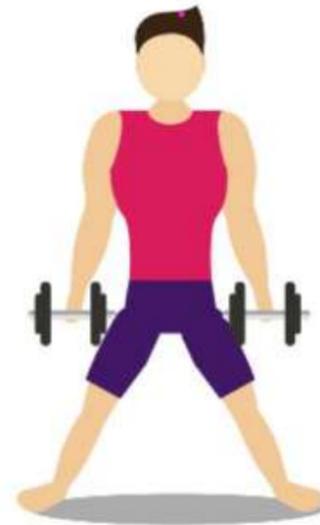


$A = 10000 \text{ g}$

$B = 5 \text{ kg}$

$A < B$

(A)

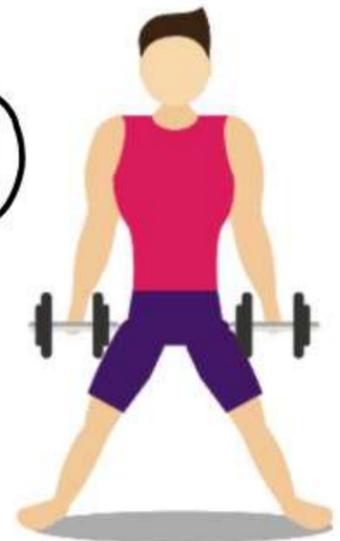


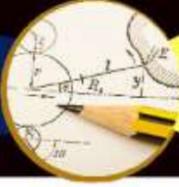
$A = 5 \text{ kg}$

$B = 10,000 \text{ gram}$

$B > A$

(B)





Classification of Physical Quantities भौतिक राशियों का वर्गीकरण

On The Basis Of
Measurement / Unit
माप/इकाई के आधार पर

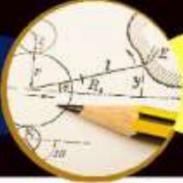
**Fundamental
Quantities**
(मूल मात्रक)

**Derived
Quantities**
(व्युत्पन्न मात्रक)

On the basis of
Direction And Magnitude
दिशा और परिमाण के आधार पर

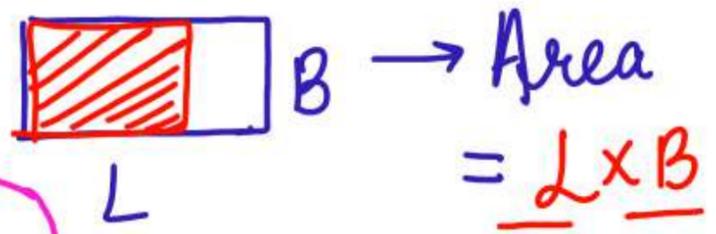
**Scalar
Quantities**
(अदिश राशियाँ)

**Vector
Quantities**
(सदिश राशियाँ)



मात्रक के प्रकार Types of units

clear



✓ Physics → 07 +02

(1) मूल मात्रक (Fundamental Units)

Infinite (2) व्युत्पन्न मात्रक (Derived Units)

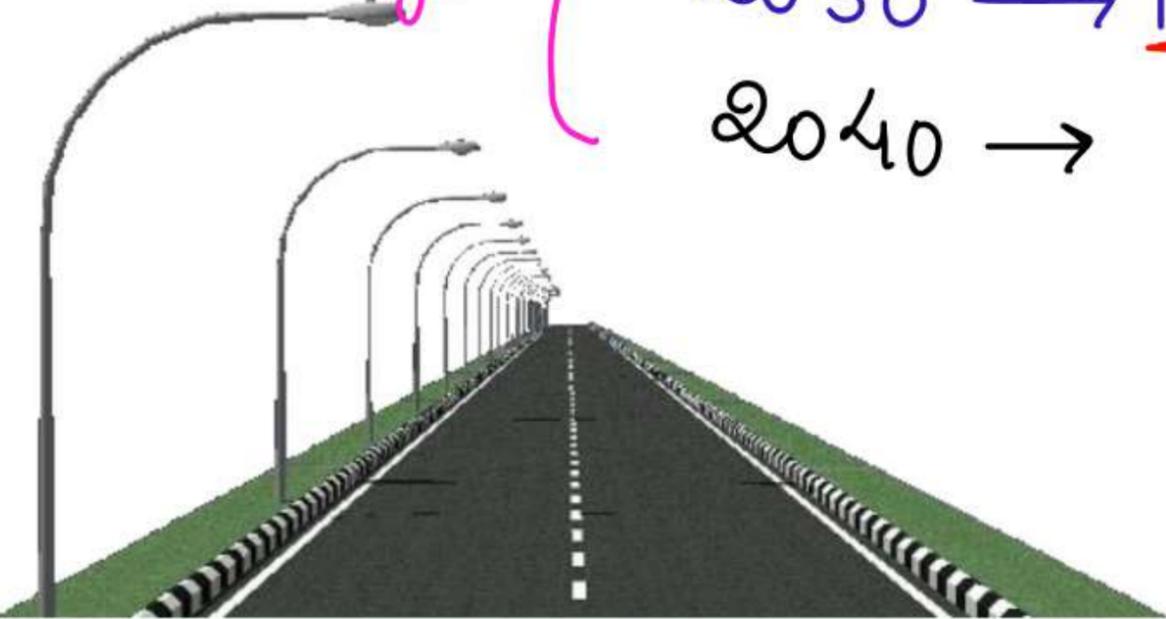
which do not depend upon other physical quantities
जो अन्य भौतिक राशियों पर निर्भर नहीं करते

which depend on fundamental quantities
called derived quantities

समय change.

Time ↔ Length
2025 year → 10 km
2030 → 12 km × 10 km
2040 → 8 km × 10 km

जो मूल राशियों पर निर्भर करते हैं जिन्हें व्युत्पन्न राशियाँ कहते हैं
चाल = distance = दूरी
Speed → time समय





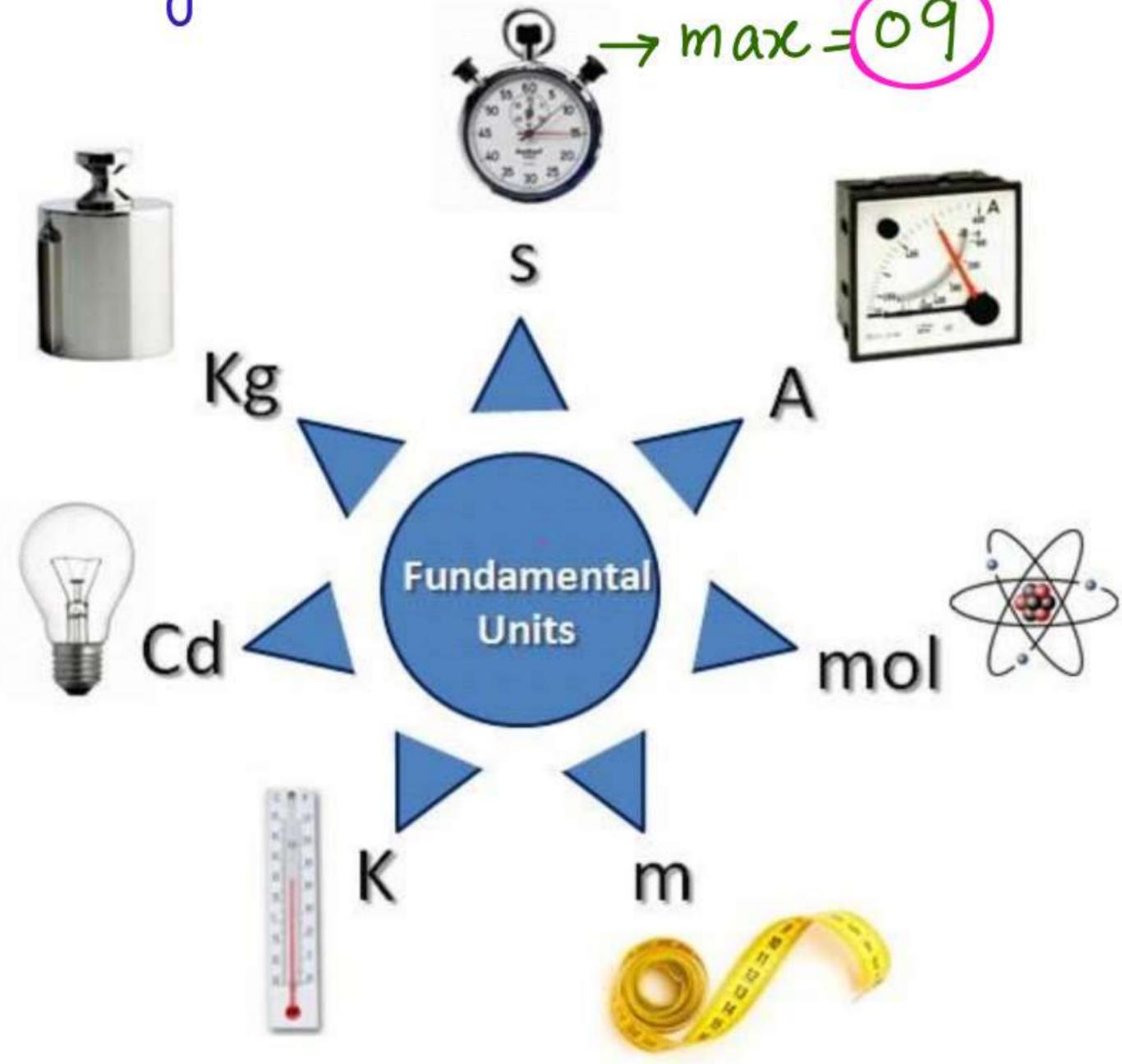
07

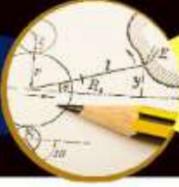
मूल मात्रक Fundamental Units - fix → No-change.

Fundamental Unit

→ max = 09

भौतिक राशि (Physical Quantity)	SI मात्रक/इकाई (SI Unit)	प्रतीक/संकेत (Symbol)
1. लंबाई (Length) (1983)	मीटर (Metre)	m m
2. द्रव्यमान (Mass)	किलोग्राम (Kilogram) (1889)	Kg
3. समय (Time)	सेकंड (Second) (1967)	s
4. विद्युत्-धारा (Electric Current)	एम्पियर (Ampere) (1948)	A
5. ताप (Temperature)	केल्विन (Kelvin) (1967)	K
6. ज्योति-तीव्रता (Luminous Intensity)	कैण्डेला (Candela) (1979)	Cd
7. पदार्थ की मात्रा (Amount of substance)	मोल (Mole) (1971)	mol





Class - 11

NCERT

Base quantity	SI Units		
	Name	Symbol	Definition
Length	metre	m	The metre is the length of the path travelled by light in vacuum during a time interval of $1/299,792,458$ of a second (1983)
Mass	kilogram	kg	The kilogram is equal to the mass of the international prototype of the kilogram (a platinum-iridium alloy cylinder) kept at international Bureau of Weights and Measures, at Sevres, near Paris, France (1889)
Time	second	s	The second is the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium-133 atom. (1967)
Electric current	ampere	A	The ampere is that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 metre apart in vacuum, would produce between these conductors a force equal to 2×10^{-7} newton per metre of length. (1948)
Thermo dynamic Temperature	kelvin	K	The kelvin, is the fraction $1/273.16$ of the thermodynamic temperature of the triple point of water. (1967)
Amount of substance	mole	mol	The mole is the amount of substance of a system, which contains as many elementary entities as there are atoms in 0.012 kilogram of carbon - 12. (1971)
Luminous intensity	candela	cd	The candela is the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency 540×10^{12} hertz and that has a radiant intensity in that direction of $1/683$ watt per steradian. (1979)

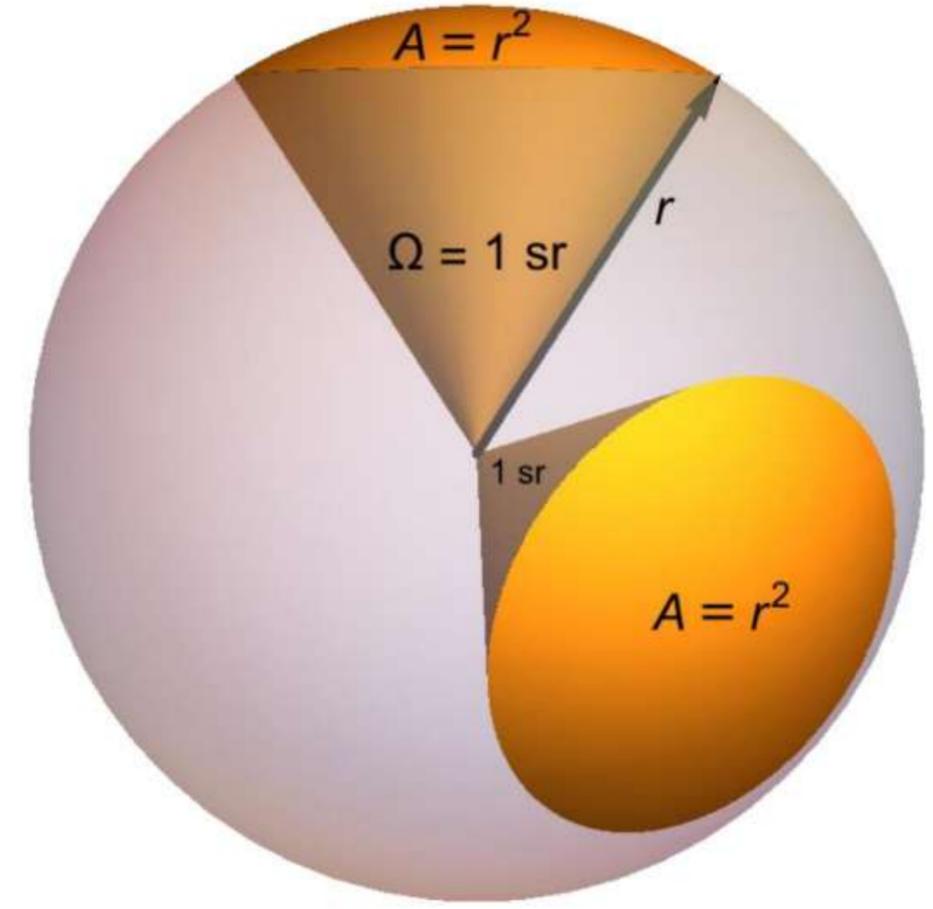
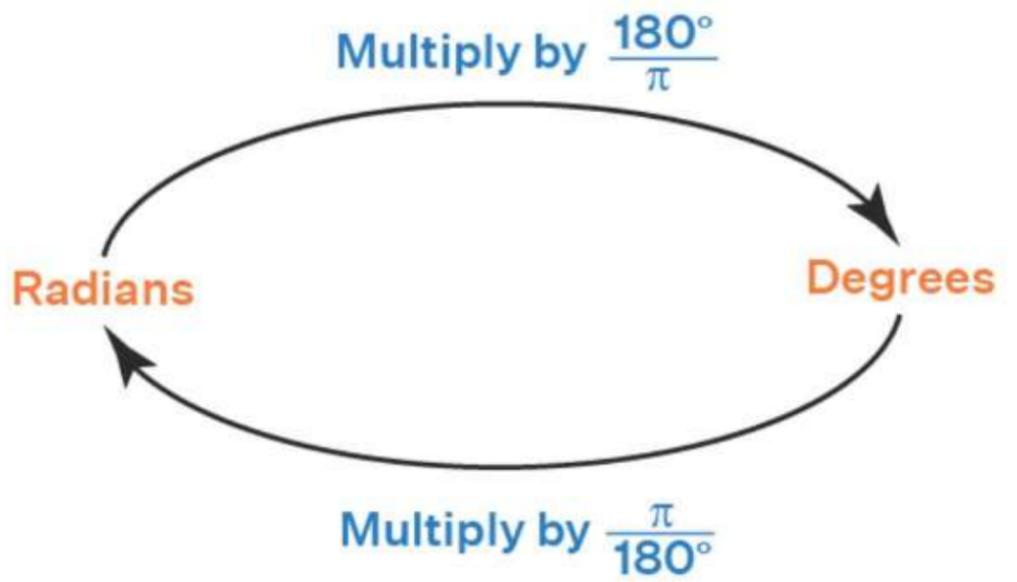
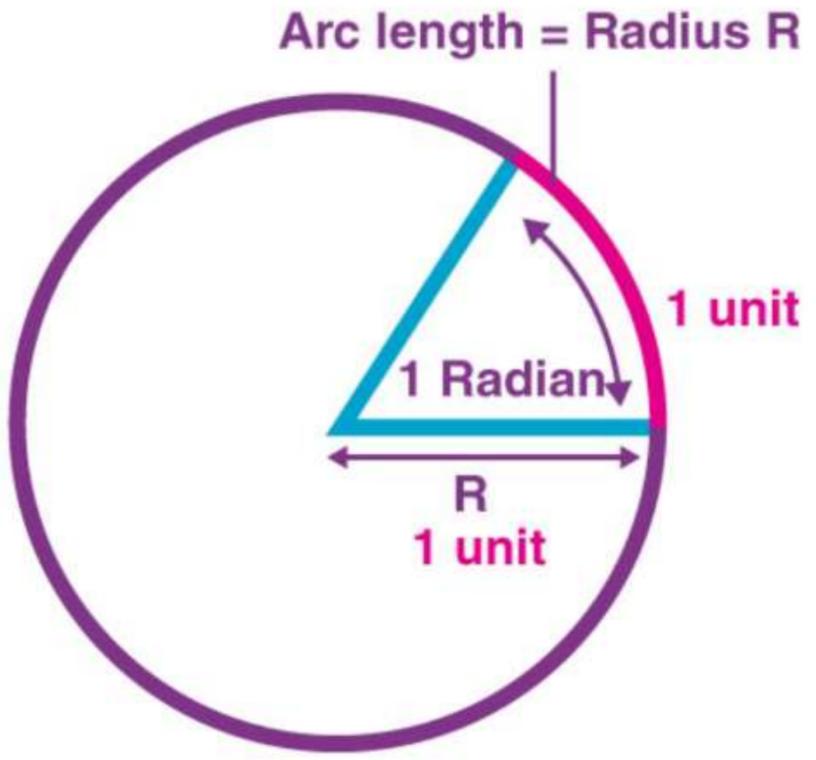


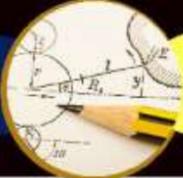
सम्पूरक मात्रक Supplementary Units

कक्षा-2 - Fundamental.

①	समतल कोण (Plane Angles) (2D)	<u>रेडियन (Radian)</u>	<u>rad</u>
②	ठोसीय कोण (Solid Angles) (3D)	<u>स्टेरेडियन (Steradian)</u>	sr

Sphere





कतई जहर.

चमका

व्युत्पन्न मात्रक (Derived Unit)

which depend on fundamental quantities called derived quantities

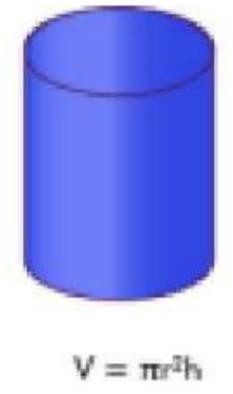
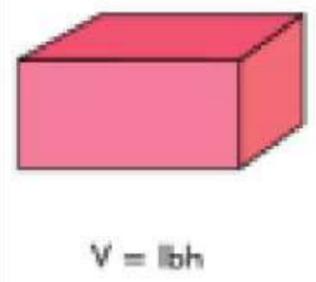
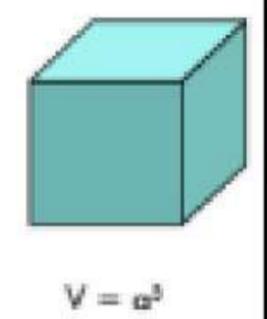
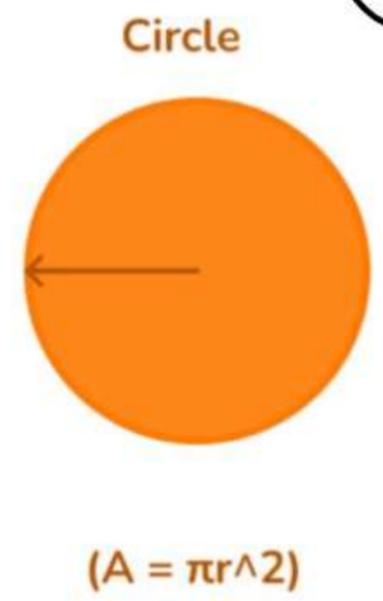
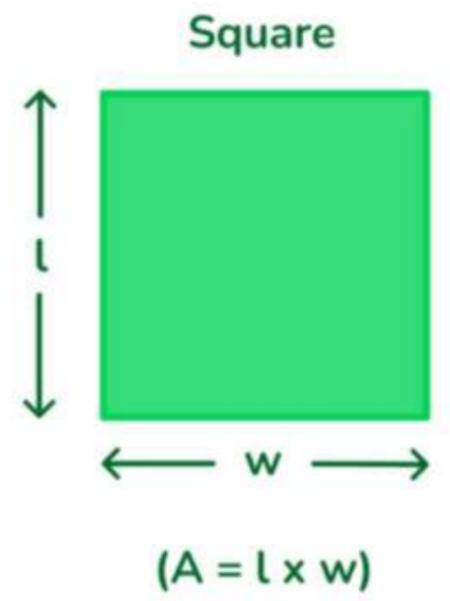
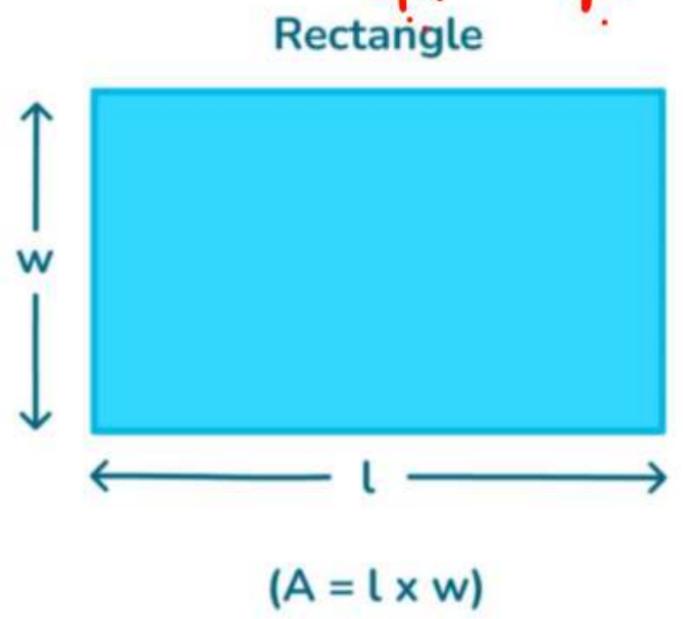
जो मूल राशियों पर निर्भर करते हैं जिन्हें व्युत्पन्न राशियाँ कहते हैं

① Area (क्षेत्रफल)

$$\begin{aligned}
 \textcircled{A} &= L \times B \\
 &= \frac{m}{f} \times \frac{m}{f} = m^2
 \end{aligned}$$

A = m²

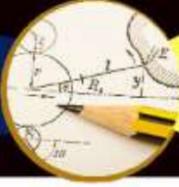
Clear → prove.



Volume = Area × height
 आयतन क्षेत्रफल × ऊंचाई

V = m² × m

V = m³



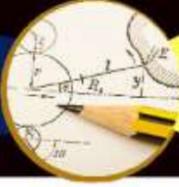
$$\frac{1}{a} = a^{-1}$$

Clear

व्युत्पन्न मात्रक (Derived Unit)

$$\frac{1}{a^3} = a^{-3}$$

S.No	भौतिक राशि (Physical Quantity)	सूत्र / अभिव्यक्ति (Expression)	मात्रक (Unit)
1	क्षेत्रफल (Area)	लंबाई × चौड़ाई (Length × Breadth)	$A = m^2$
2	आयतन (Volume)	क्षेत्रफल × ऊँचाई (Area × Height)	$V = m^3$
3	घनत्व (Density)	द्रव्यमान / आयतन (Mass / Volume)	$\rho = \frac{m}{V} = \frac{kg}{m^3} = kg\ m^{-3}$
4	वेग (Velocity)	विस्थापन / समय (Displacement / Time) $\rightarrow m$	$v = \frac{m}{s} = m\ s^{-1}$
5	\vec{P} संवेग (Momentum)	द्रव्यमान × वेग (Mass × Velocity)	$\vec{p} = m \times v = kg\ m\ s^{-1}$
6	त्वरण (Acceleration)	वेग / समय (Velocity / Time)	$\vec{a} = \frac{m\ s^{-1}}{s} = m\ s^{-2}$
7	बल (Force)	द्रव्यमान × त्वरण (Mass × Acceleration)	$F = kg\ m\ s^{-2}$



DIFFERENT TYPES OF SYSTEM OF UNITS विभिन्न प्रकार की इकाइयों की प्रणाली

(1) CGS पद्धति (Centimetre Gram Second System)

- इसे फ्रेंच या मीट्रिक पद्धति भी कहते हैं।
- It is also called French or metric system.

(2) FPS पद्धति (Foot Pound Second System)

- इसे ब्रिटिश पद्धति भी कहते हैं।
- This is also called the British system.

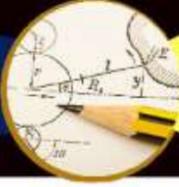
(3) MKS पद्धति (Metre Kilogram Second System)

SI

measurement = magnitude + Unit

इकाई

System	लंबाई Length	द्रव्यमान Mass	समय Time
F.P.S.	foot	pound	second
C.G.S.	centimetre	gram	second
M.K.S.	metre	kilogram	second



United Nation

1971 में आयोजित 14वें वजन और माप पर आम सम्मेलन 14th General Conference on Weights and Measures, 1971) ने

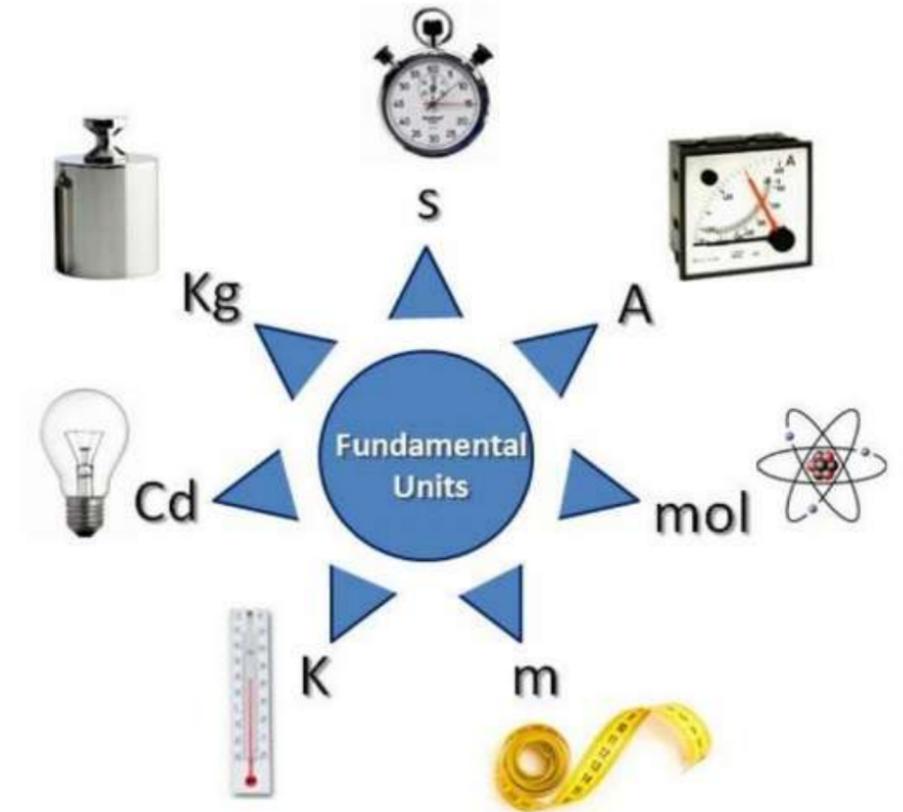
सात आधार या मौलिक इकाइयाँ (seven base or fundamental units) अपनाईं।

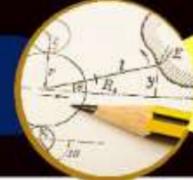
◆ ये इकाइयाँ मिलकर SI प्रणाली (SI system) बनाती हैं।

◆ SI नाम (SI name) *Systeme International d'Unités* का संक्षिप्त रूप (abbreviation) है → जिसका अर्थ है अन्तर्राष्ट्रीय इकाई प्रणाली

(International System of Units)।

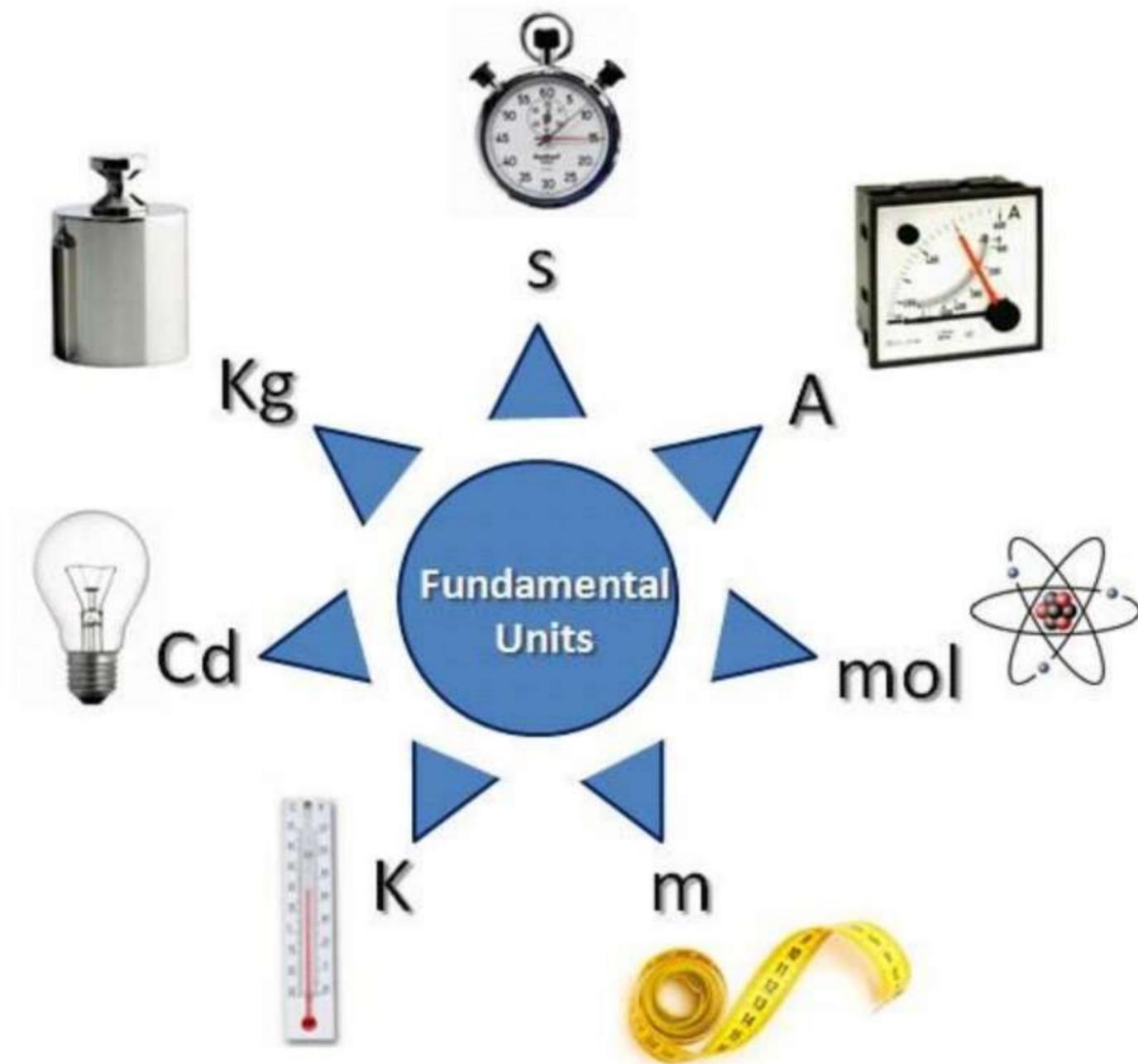
◆ इस प्रणाली को लोकप्रिय रूप से मीट्रिक प्रणाली (Metric System) कहा जाता है।

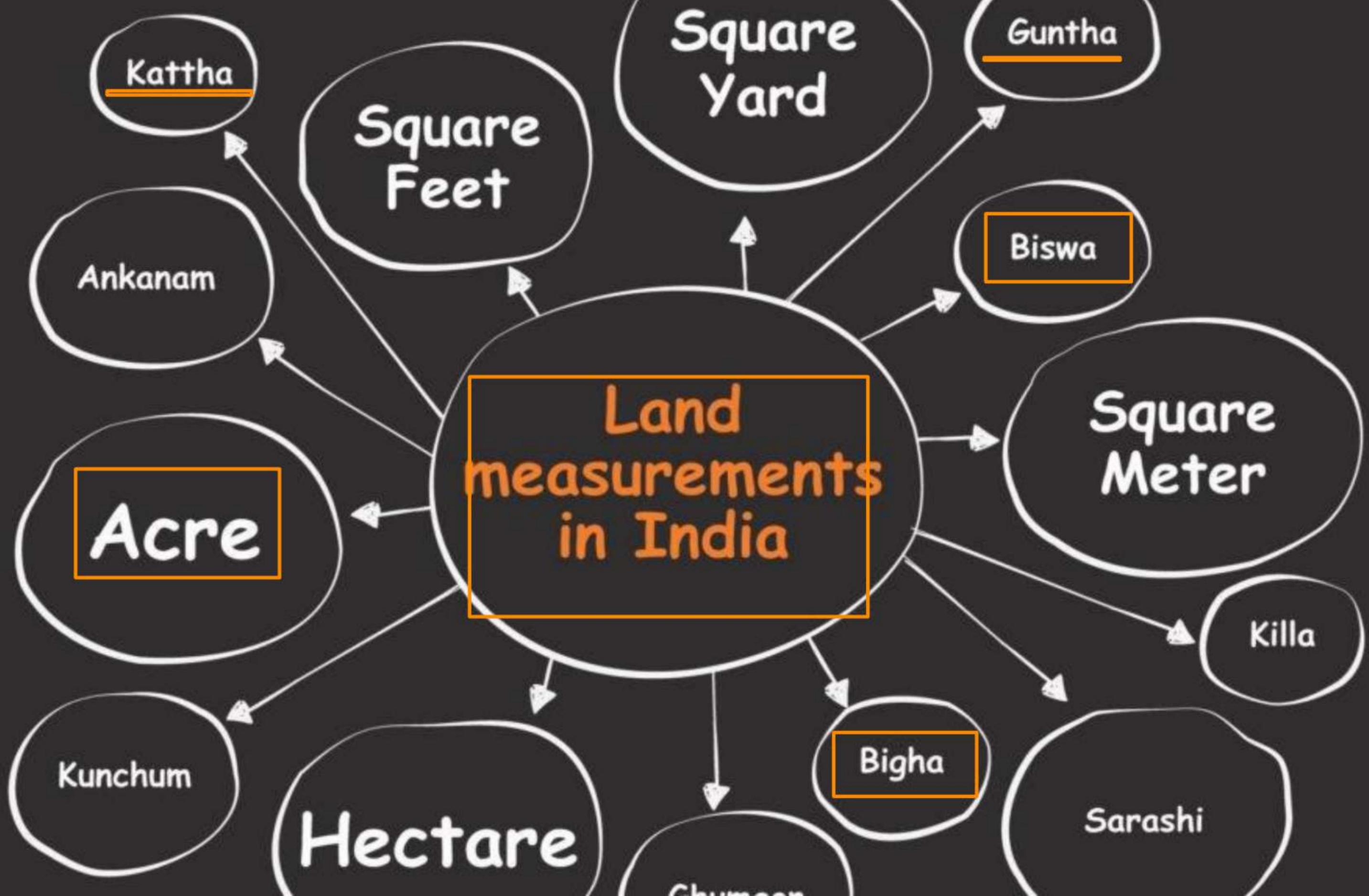


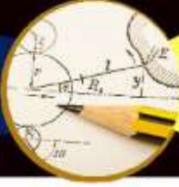


मूल मात्रक Fundamental Units

भौतिक राशि (Physical Quantity)	SI मात्रक/इकाई (SI Unit)	प्रतीक/संकेत (Symbol)
1. लंबाई (Length)	मीटर (Metre)	M
2. द्रव्यमान (Mass)	किलोग्राम (Kilogram)	Kg
3. समय (Time)	सेकंड (Second)	S
4. विद्युत्-धारा (Electric Current)	एम्पियर (Ampere)	A
5. ताप (Temperature)	केल्विन (Kelvin)	K
6. ज्योति-तीव्रता (Luminous Intensity)	कैण्डेला (Candela)	Cd
7. पदार्थ की मात्रा (Amount of substance)	मोल (Mole)	mol







7 Schedule

1976 का 42 वां संशोधन अधिनियम पांच विषयों को राज्य सूची से समवर्ती सूची में ले गया। The 42nd Amendment Act of

1976 moved five subjects from the State List to the Concurrent List.

State Union

वे हैं:

1. शिक्षा / Education ✓

2. वन / Forest ✓

1976

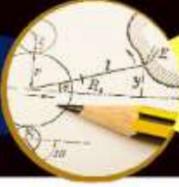
3. वजन और माप तोल / Weights and Measures

India में SI System लागू

4. वन्य पशु और पक्षियों का संरक्षण / Conservation of wild animals and birds

5. न्याय का प्रशासन / administration of justice





Classification of Physical Quantities भौतिक राशियों का वर्गीकरण

On The Basis Of
Measurement / Unit

माप/इकाई के आधार पर

Fundamental
Quantities
(मूल मात्रक)

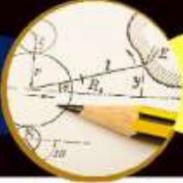
Derived
Quantities
(व्युत्पन्न मात्रक)

On the basis of
Direction And Magnitude

दिशा और परिमाण के आधार पर

Scalar
Quantities
(अदिश राशियाँ)

Vector
Quantities
(सदिश राशियाँ)



Classification of Physical Quantities

भौतिक राशियों का वर्गीकरण

कई जगह
detail

On the basis of
Direction And Magnitude

दिशा और परिमाण के आधार पर

अदिश (Scalars)

Direction दिशा (X)

Magnitude परिमाण (✓)

समय = 10 hours

SCALAR	VECTOR
A scalar quantity has magnitude only.	A vector has both magnitude and direction.
 speed  mass  volume  time	 velocity  weight  friction

सदिश (Vectors)

Direction दिशा (✓)

Magnitude परिमाण (✓)

Force (F) \rightarrow दिशा

= 10 Newton