ARJUNA NEET BATCH

UNITS AND MEASUREMENTS

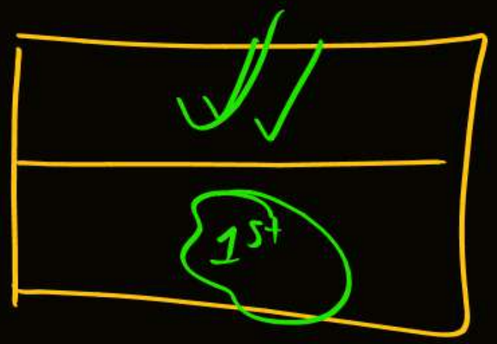
LECTURE - 05

(1) Equation is Dimensionally correct then it must be (physically) correct

[Ans] → false

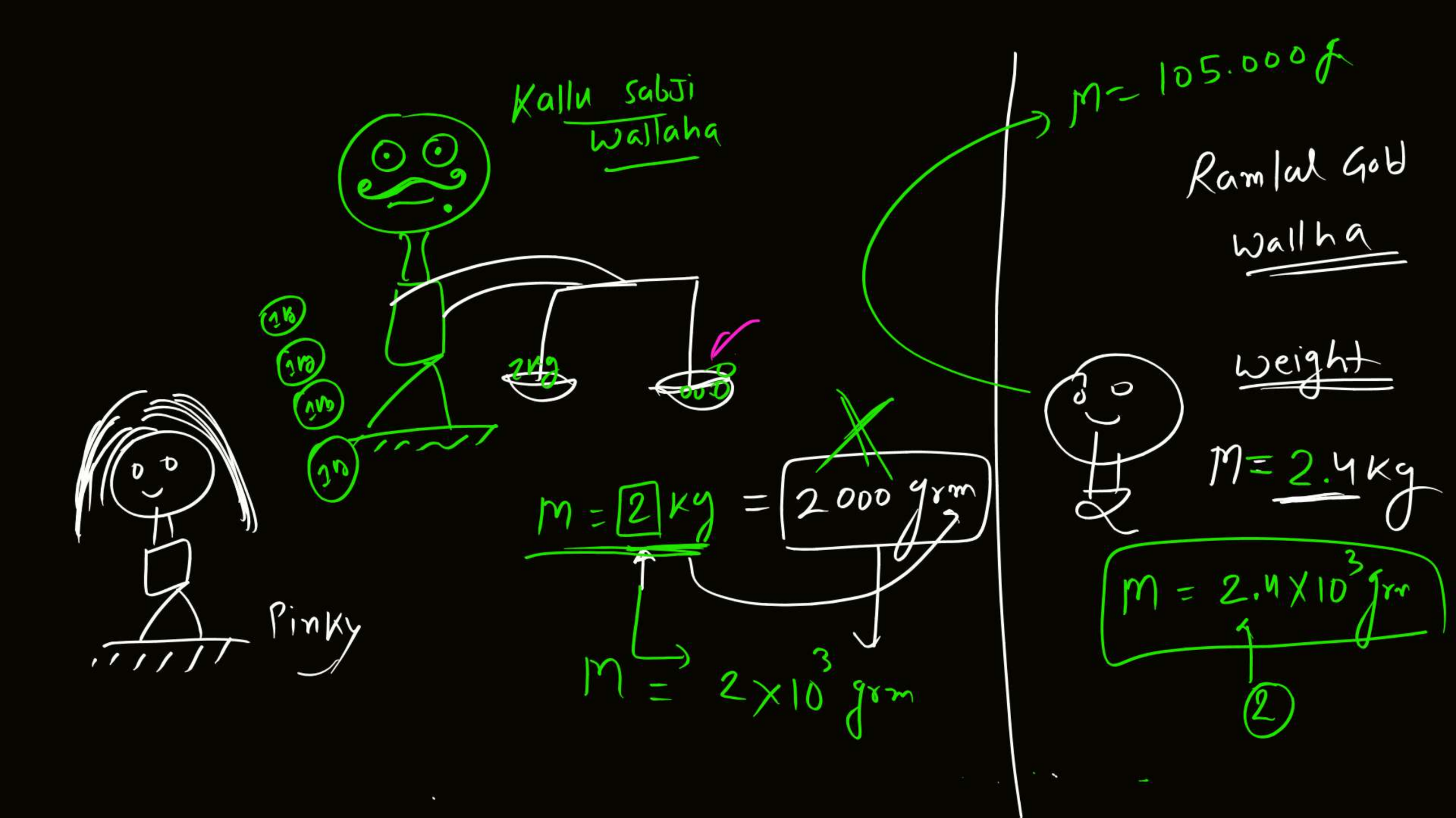
(2) A equation is physically correct then it may be dimensionally correct.

⇒ False



(a) A P.Q have dimension then it may have Unit ⟹ False

(b) A P.Q have Unit then it must be dimension less ⟶ False


Kallu sabji Wallaha
1kg
1kg
1kg
1kg
2kg
Pinky
m = 2 ky = 2000 grm
m = 2 × 10^3 grm
m = 105.000 gm
Ramlal Gold Wallha
weight
m = 2.4 kg
m = 2.4 × 10^3 grm
2

$l = 400\ m = 4 \times 10^2\ m = 4 \times 10^4\ cm$

→ significal digit = 1

$l = 4.00\ m = 4.00 \times 10^2\ cm$

→ S.F = (3)

2.135 kg

Significant Figures

Significant Figures (Meaningful Digits

2 kg

- All non-zero digits are significant

  Ex – 44 m ⇒ 2 ✓

- All zeros between non-zero digits are significant

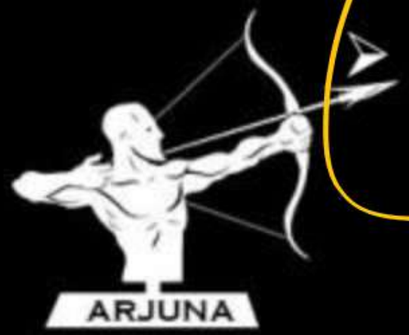
  Ex – 405 m ⇒ 3 ✓

- All zeros on left side are non-significant.
- Exact number have infinite significant figure
- Power form are not considered as significant figure.

04 m ⇒ S.F

Ex 043.0 ⇒ S.F = 3

1.000000000 - - - - -



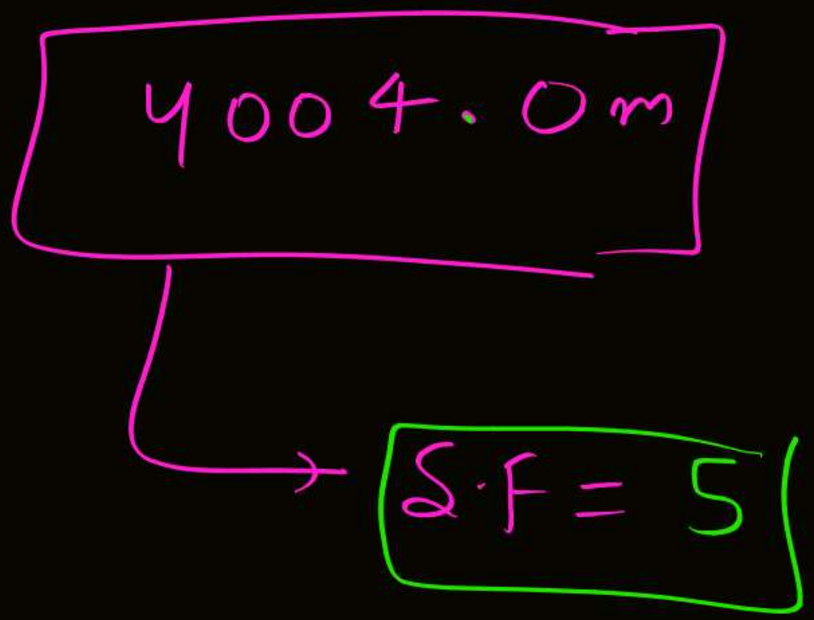
✡ Trailing zero after decimal place is significant.

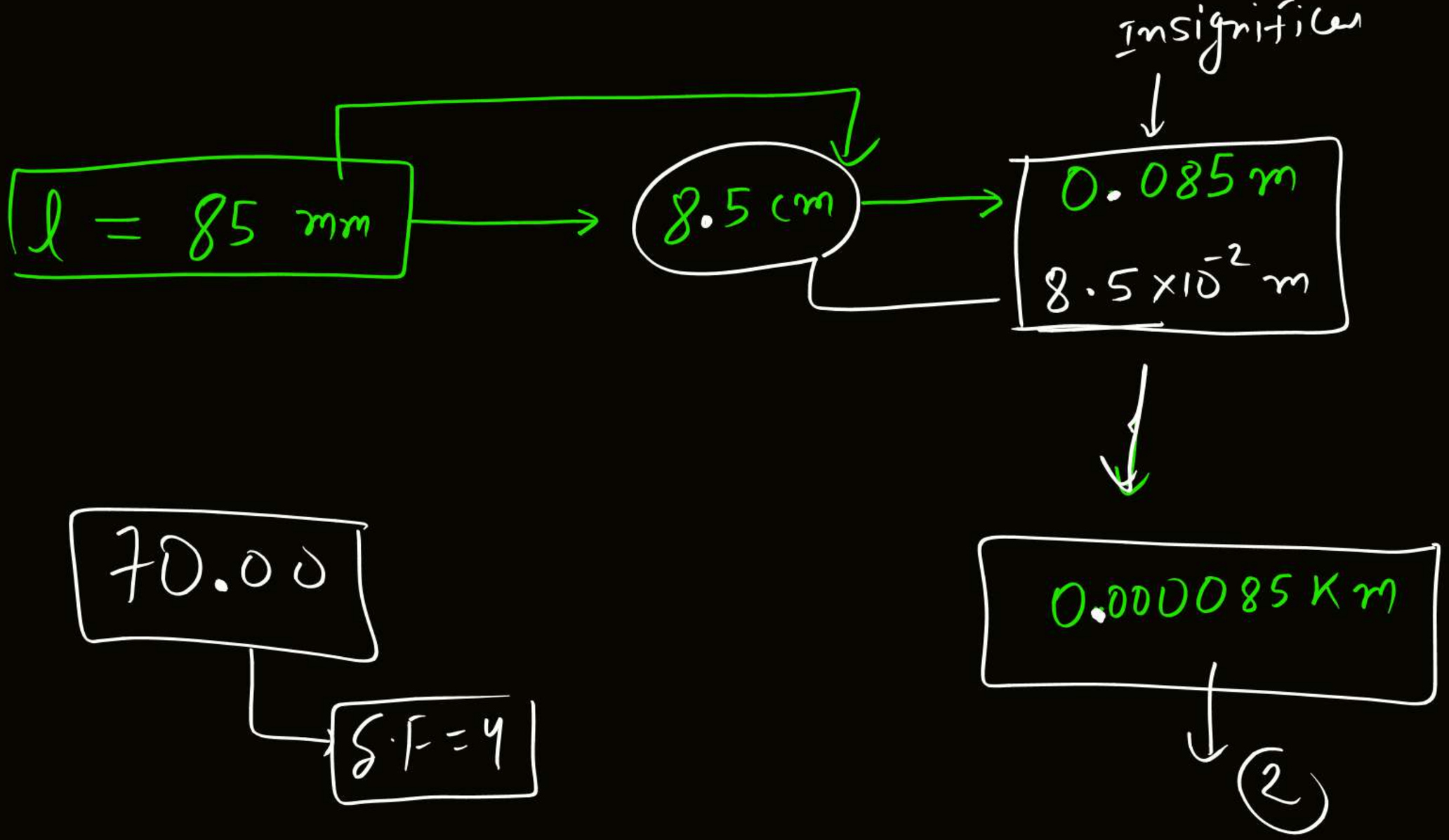
$l = 3.5\ cm$	$l = 3.50\ cm$	$l = 3.500\ cm$
⇓	↓	⇓
S.F = 2	S.F = 3	S.F = 4

200 Kg → S.F = 1

400 cm → S.F = 1

40040 → S.F = 4


4004.0m
S.F = 5


Insignificant
l = 85 mm
8.5 cm
0.085 m
8.5 × 10⁻² m
70.00
S.F = 4
0.000085 Km
2

The number of significant figures in 0.01020 is :

(A) 1 (B) 2

(C) 3 (D) 4

The number of significant figures in 0.900 is :

(A) 1 (B) 2

(C) 3 (D) 4

The number of significant figures in 0.007 is :

(A) 4 (B) 3

(C) 2 (D) 1

The number of significant figures in (i) 0.03800 and (ii) 90.00 is :

(A) (i) D (ii) D (B) (i) B (ii) A

(C) (i) C (ii) C (D) (i) B (ii) D

The number of significant figures in 3.04×10^{23} is :

(A) 2

(B) 3

(C) 23

(D) 25

Given P = 0.0030 m, Q = 2.40 m and R = 3000 m, the number of significant figures in P, Q, R are respectively :

(A) 1, 2, 1

(B) 2, 3, 1

(C) 4, 2, 1

(D) 4, 2, 4

- **Addition or Subtraction**
  - Final result is written in minimum decimal places.

Why ??

- **Multiplication or Division**
  - Final result written in minimum significant figure.

If A = 2.413 and B = 1.2 then find A + B.

$\Rightarrow A + B$

$2.413 + 1.2 = 3.613$ ✗

$= 3.6$ ✓ Ans

If A = 25.5 and B = 5 then find $\frac{A}{B}$.

$$\frac{A}{B} = \frac{25.5}{5} = 5.1 \simeq 5$$

Ans

$\frac{1.5}{1.5}$ is equal to

(A) 1

(B) 1.0

(C) 1.00

(D) 1.000

$\left[\frac{1.5}{1.5}\right] = 1.0$

↳ Two significant digit

Taking into account of the significant figures, what is the value of 9.99 m – 0.0099 m? [NEET 2020]

(A) 9.9801 m

(B) 9.98 m

(C) 9.980 m

(D) 9.9 m

$\Rightarrow 9.99\,m - 0.0099\,m = ??$

MR*

↳ min^m decimal place

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ROUNDING OFF

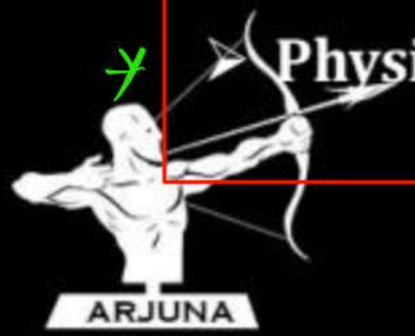
- If digit to be removed is less than 5 then there is no change in ~~preceding~~ previous number. 2464 ⇒ 246
- If digit to be removed is greater than 5 then there previous number increases by 1. 2468 ⇒ 247
- If digit is 5, then previous number remains same if even and increase by 1 then if odd.

* - Dimensionally correct equation must be (physically) correct. → False

* - Dimensionally incorrect must be physically correct. → False

* - Physically incorrect equation may be dimensionally correct. → True

* - Physically correct may be dimensionally correct. → False



last digit 5

even

as it is

Ex 24685 = 2468

odd

↑ by 1

24375 = 2438

When 96.54 is divided by 2.40, the correct result is :

(A) 40.2250 ×

(B) 40.225 ×

(C) 40.23 ×

(D) 40.2

S.F = 3

$= \frac{96.54}{2.40} = 40.2$

MR

Find round off value of x = 6.87

(A) 6
(B) 6.7
(C) 6.8
(D) 6.9

Find round off value of x = 16.351

(A) 16
(B) 16.33
(C) 16.3
(D) 16.4

16.35 (1) x

16.4

Find round off value of x = 3.750

(A) 3.7
(B) 3.8
(C) 3.5
(D) 3

Find round off value of x = 3.250

(A) 3.2
(B) 3.25
(C) 3.5
(D) 3

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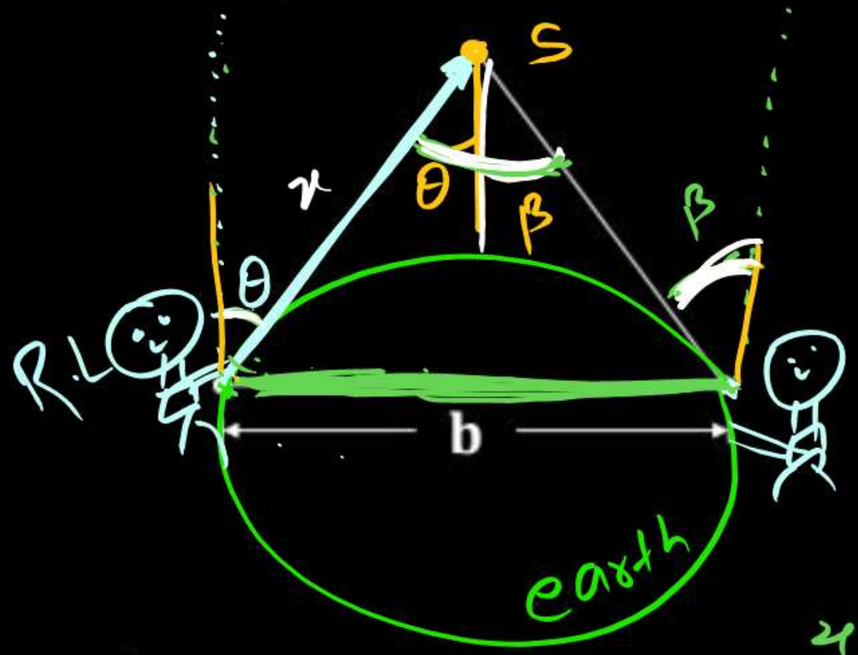
PARALLAX METHOD

→ Not important for NEET

Change in the apparent position of the object when viewed from two different points of view.

measure the dist^n b/w Planet & earth (x)



S – Position of the planet

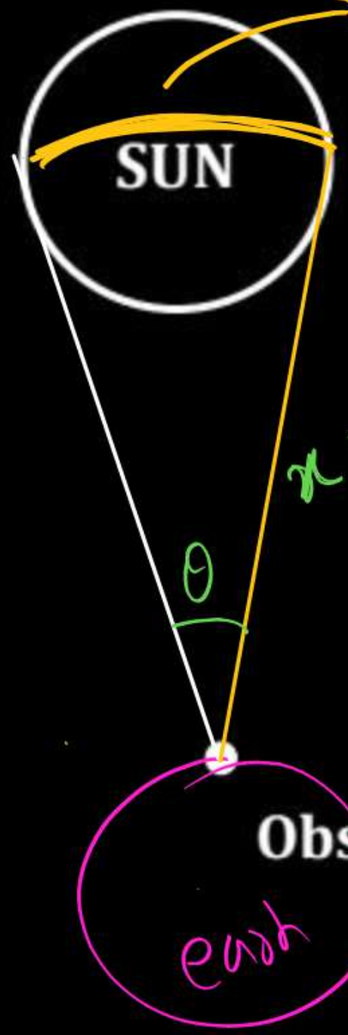
b = distance between two point of observation

$(\theta + \beta) = \gamma$ = Small angle $\{x >>> d\}$

Arc $= b = x\gamma$

$$x = \frac{b}{\gamma} = \text{dist}^n \text{ of sun from earth}$$

Measurement of Diameter of Planet



diametre = D

x = distn b/w sun & earth.

$$\text{Arc} = D = \theta x$$

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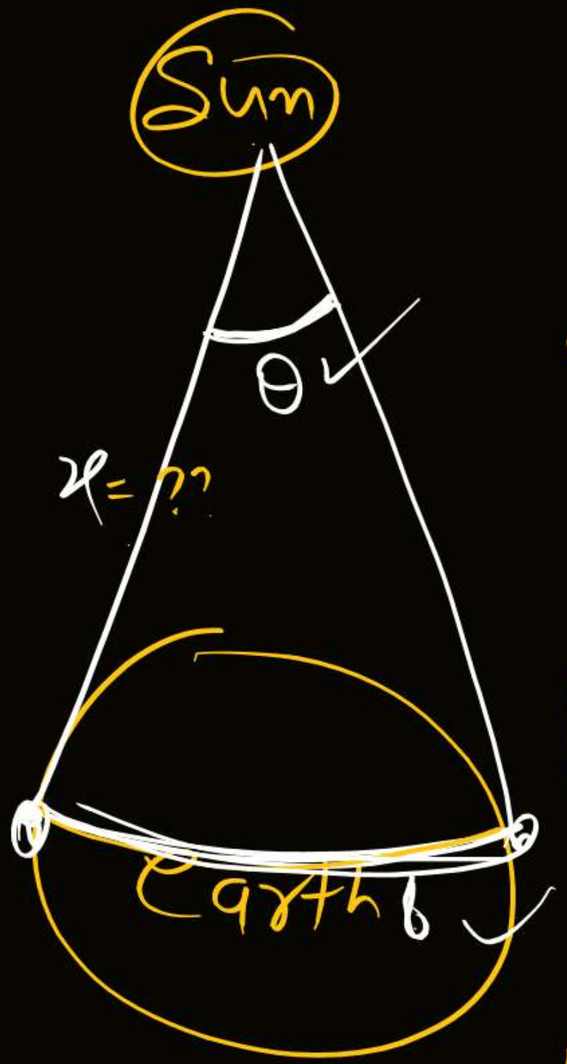
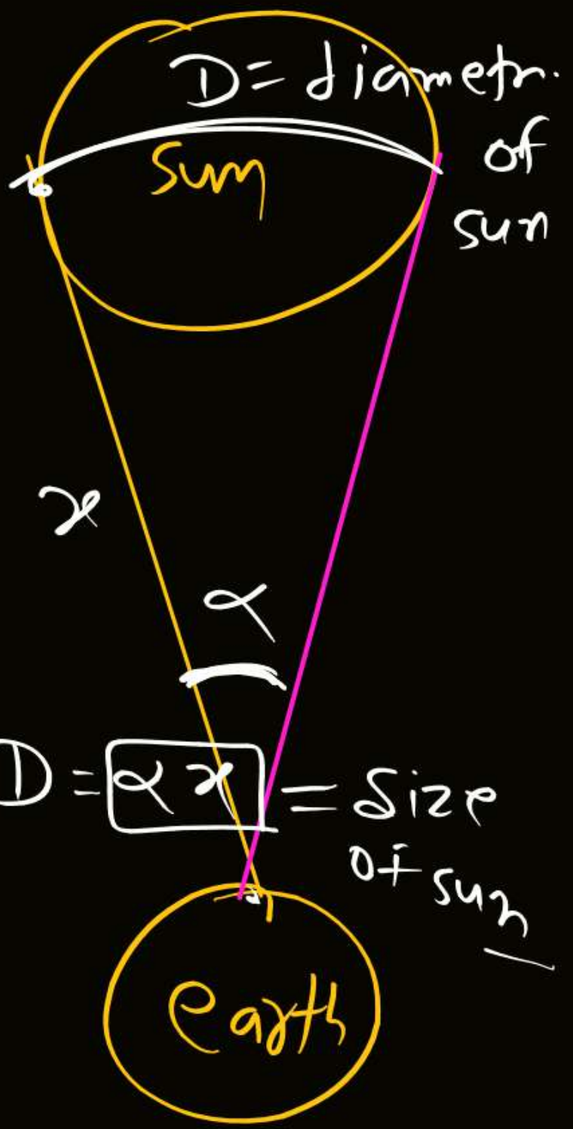


dist^{n} b/w sun & earth.

$$r = \frac{b}{\theta}$$

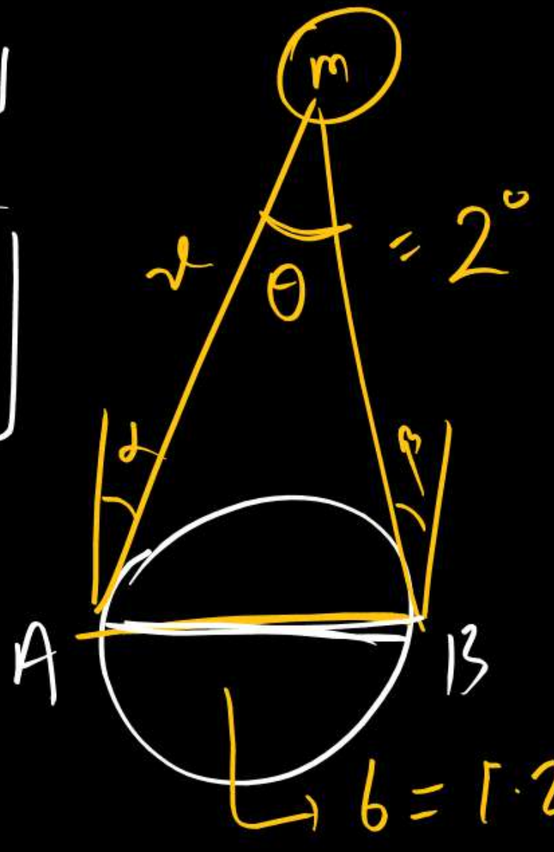
$$\text{Arc} = b = r\theta$$



The moon is observed from two diametrically opposite points A and B on Earth. The angle θ subtended at the moon by the two directions of observation is 2°, Given the diameter of the Earth to be about 1.276×10^7 m, compute the distance of the moon from the Earth.

$180° = \pi$ rad

$2° = \frac{\pi}{90}$ rad



$b = 1.276 \times 10^7$ m

$b(\text{Arc}) = r\theta$

$r = \frac{b}{\theta} = \frac{1.27 \times 10^7}{\left(\frac{\pi}{90}\right)}$

$= \left(\frac{1.27 \times 90}{\pi}\right) 10^7$

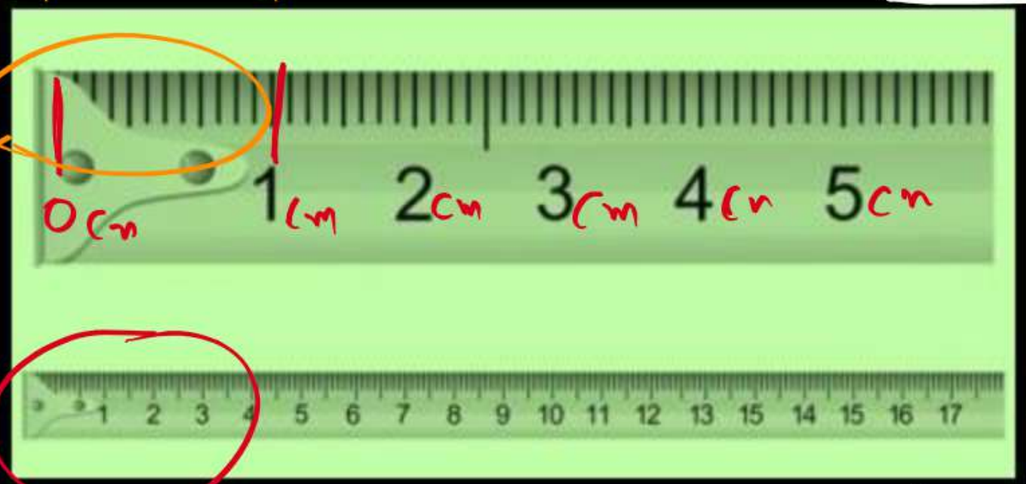
$\simeq 35 \times 10^7$

MEASURING INSTRUMENT

Metre scale :

1 cm = 10 division

1 Division = 1 M.S.D = $\frac{1\text{ cm}}{10}$ = 1 mm

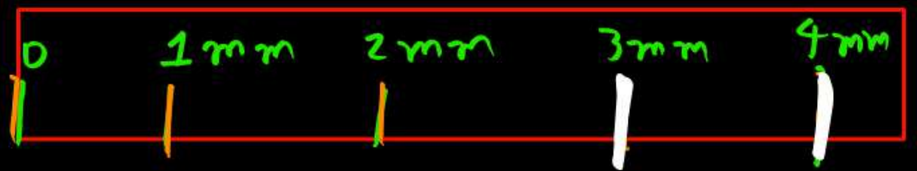


metre scale

magnify

metre scale

Length of ROD :



Rod

length = ??

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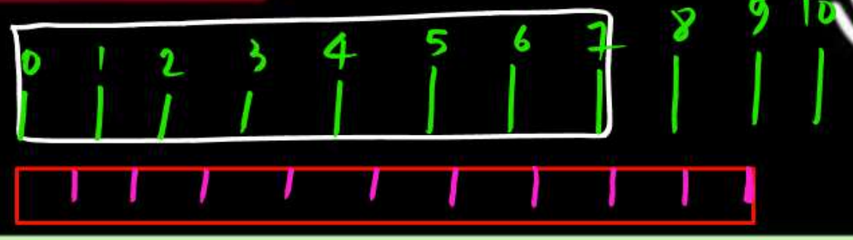
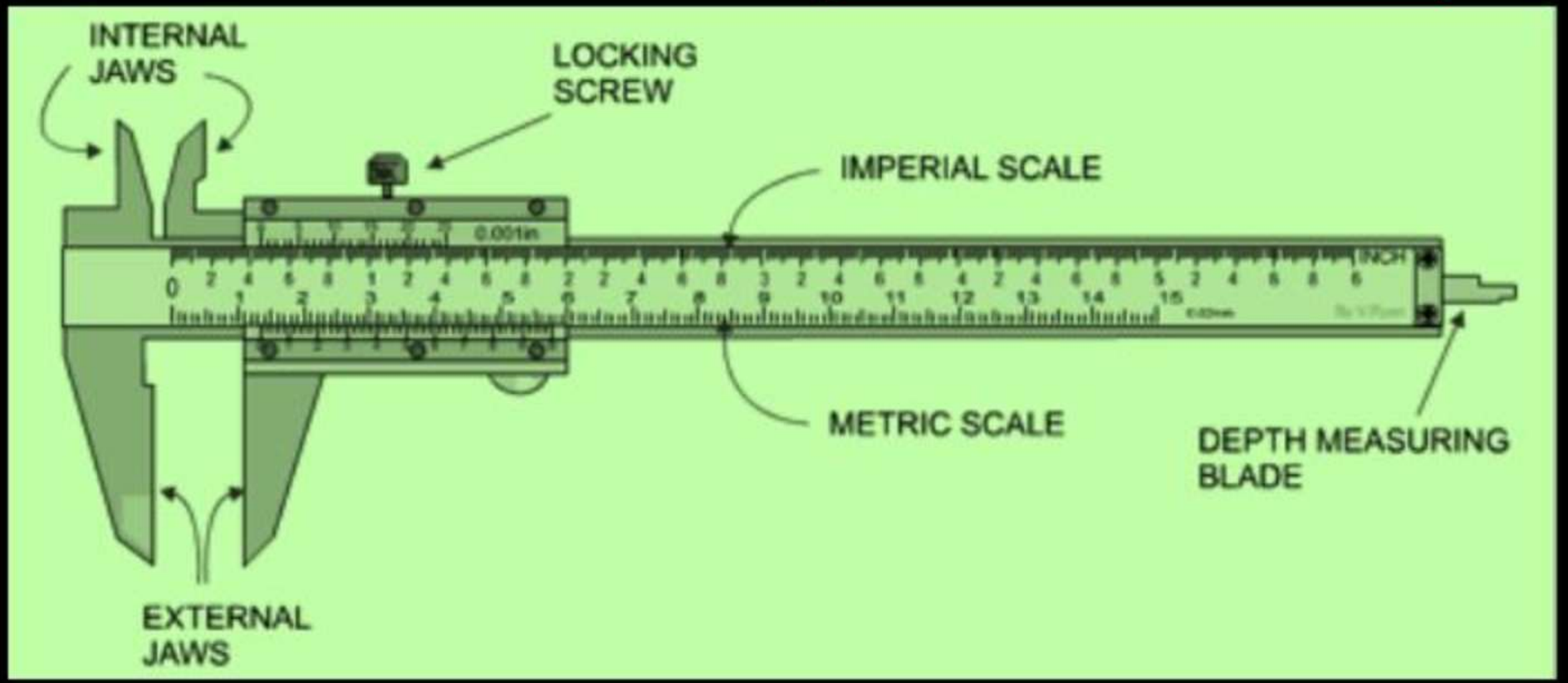
DIMENSIONAL FORMULA

Vernier Callipers :





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In a Vernier calliper, one main scale division is x cm and n division of Vernier scale coincide with $(n - 1)$ division of the main scale. The least count of the Vernier caliper in cm is :

(a) $\left(\frac{n-1}{n}\right)x$

(b) $\frac{nx}{(n-1)}$

(c) $\frac{x}{n}$

(d) $\frac{x}{n-1}$

The main scale of a Vernier callipers has n divisions/cm. n divisions of the Vernier scale coincide with $(n - 1)$ divisions of main scale. The least count of the Vernier callipers is

(a) $\frac{1}{(n+1)(n-1)}$ cm

(b) $\frac{1}{n}$ cm

(c) $\frac{1}{n^2}$ cm

(d) $\frac{1}{n(n+1)}$ cm

A student measured the diameter of a small steel ball using a screw gauge of least count 0.001 cm. The main scale reading is 5 mm and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero error of – 0.004 cm, the correct diameter of the ball is

(NEET-2018)

(a) 0.521 cm

(b) 0.525 cm

(c) 0.053 cm

(d) 0.529 cm

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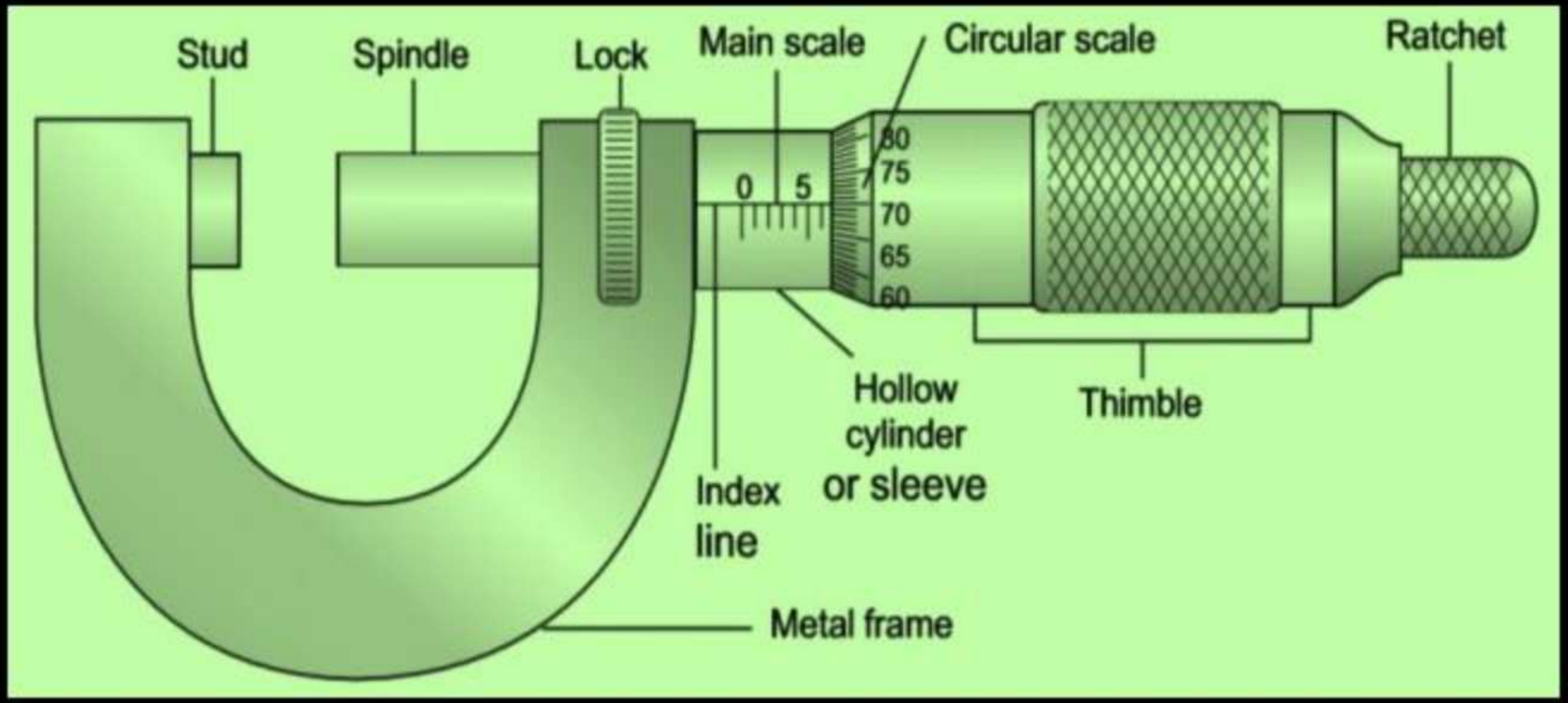
SCREW GAUGE



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If measured length of Rod is 1.56 cm then instrument used is

(a) metre scale

(b) Vernier calliper

(c) screw gauge

THANK YOU ☺