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JEE Main **Physics DPP**

DPP- Units & Measurements: Screw gauge
By Physicsaholics Team

Q) In a screw gauge, the main scale has divisions in millimeter and circular scale has 50 divisions. The least count of screw gauge is

(a) $2\mu m$

(b) $5\mu m$

(c) $20\mu m$

(d) $50\mu m$

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Ans. c

$$1 \text{ MSD} = 1 \text{ mm.}$$

number of divisions
in vernier scale = 50

$$1.c. = \frac{1 \text{ mm}}{50}$$

$$= 0.02 \text{ mm}$$

$$= 20 \text{ } \mu\text{m.}$$

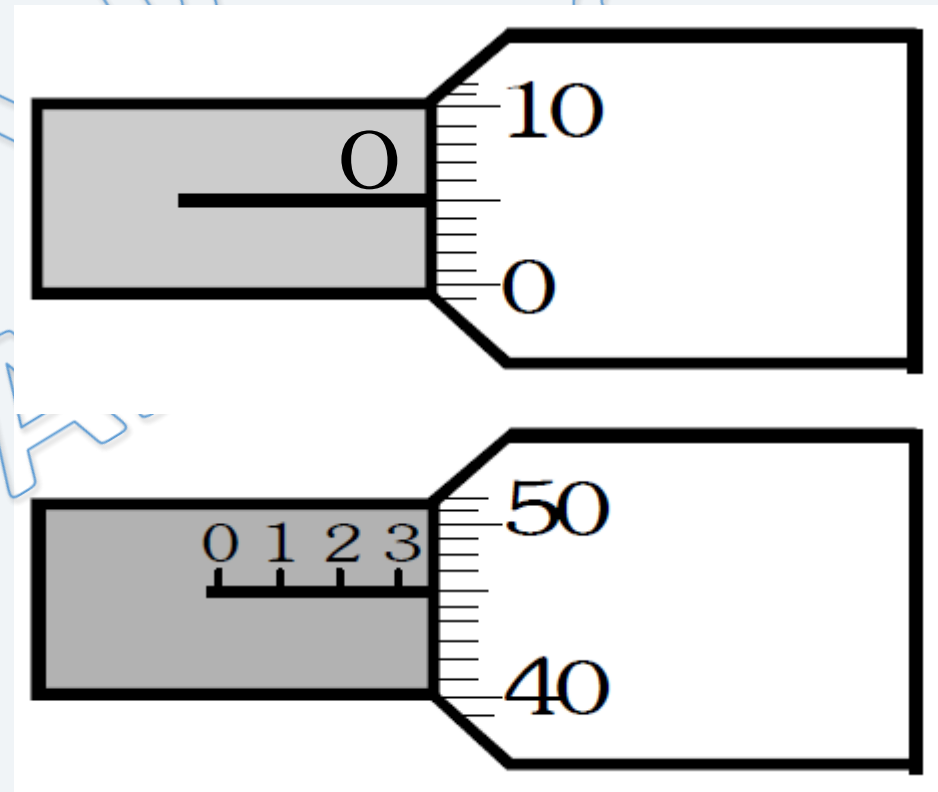
Q) The circular scale of a micrometer has 200 divisions and pitch of main scale is 2mm. Find the measured value of thickness of a thin sheet.

(a) 3.41 mm

(b) 6.41 mm

(c) 3.46 mm

(d) 3.51 mm



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Ans. b

$$L.C. = \frac{2\text{mm}}{200} = 0.01\text{mm},$$

Zero error = + 5 division of
circular scale.

$$\text{Reading} = M.S.R + L.C. \times V.S.R.$$

$$= (3 \times 2\text{mm}) + (0.01\text{mm}) [46 - 5]$$

\therefore 46 division in vernier scale

4 - 5 \rightarrow correction for
zero error.

$$\begin{aligned}\text{Reading} &= 6\text{mm} + 0.01 \times 41 = 6 + 0.41\text{mm} \\ &= 6.41\text{mm}.\end{aligned}$$

Q) A screw gauge gives the following reading when used to measure the diameter of a wire.

Main scale reading : 0 mm.

Circular scale reading : 52 divisions

Given that 1 mm on main scale corresponds to 100 divisions of the circular scale.

The diameter of wire from the above data is :-

(a) 0.026 cm

(b) 0.005 cm

(c) 0.52 cm

(d) 0.052 cm

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Ans. d

$$MSR = 0 \text{ mm}$$

$$C.S.R = 52 \text{ divisions}$$

$$L.C. = \frac{\text{Pitch of M.S.}}{\text{no. of divisions on V.S.}} = \frac{1 \text{ mm}}{100}$$

$$L.C. = 0.01 \text{ mm}$$

$$\therefore \text{Reading} = MSR + L.C. \times C.S.R.$$

$$= 0 + 0.01 \times 52$$

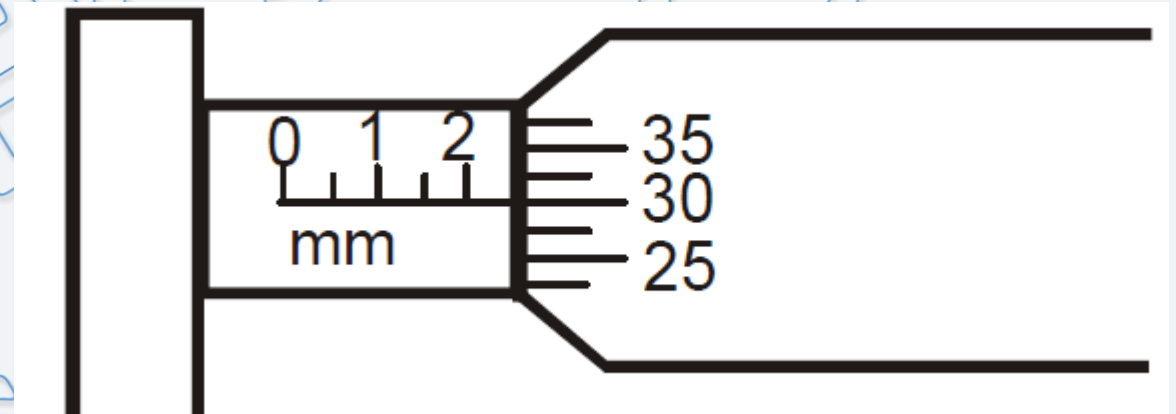
$$= 0.52 \text{ mm}$$

or

$$0.052 \text{ cm}$$

Q) What is the reading of screw gauge shown in figure? (100 divisions on circular scale)

- (a) 2.30 mm (b) 2.29 mm
(c) 2.36 mm (d) 2.41 mm



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Ans. a

In this diagram of
Screw gauge,

$$L.C. = \frac{1 \text{ mm}}{100} = 0.01 \text{ mm},$$

$$\text{Reading} = \text{MSR} + (L.C.) \times \text{VS.R}$$

$$= 2 \text{ mm} + (0.01) \times 30 \text{ mm}.$$

$$= 2 \text{ mm} + 0.30 \text{ mm}$$

$$= 2.30 \text{ mm}$$

Q) A screw gauge advances by 3mm in 6 rotations. There are 50 divisions on circular scale. Find least count of screw gauge:

(a) 0.002cm

(b) 0.001cm

(c) 0.01cm

(d) 0.02cm

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Ans. b

in 6 rotations = 3 mm,

in 1 rotation = $\frac{1}{2}$ mm,

1 rotation of
Circular Scale = 1 MSD

\therefore 1 MSD = $\frac{1}{2}$ mm,

Also no. of divisions = 50
on Circular Scale

$$\therefore L.C. = \frac{1 \text{ MSD}}{50} = \frac{\frac{1}{2} \text{ mm}}{50}$$

$$L.C. = \frac{1}{100} \text{ mm}$$

$$L.C. = 0.01 \text{ mm}$$

or

$$0.001 \text{ cm}$$

Q) A student measured the diameter of a wire using a screw gauge with least count 0.001 cm and listed the measurements. The correct measurement is –

- (a) 5.3 cm (b) 5.32 cm (c) 5.320 cm (d) 5.3200 cm

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Ans. c

$$L.C. = 0.001 \text{ cm}$$

means, instrument can measure
upto minimum 0.001 cm ,

So, 5.320 cm ~~may~~ be measured
can

with this screw gauge,
upto [3 digits after decimal]

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