



9. Consider a Vernier calliper in which each 1 cm on the main scale is divided into 8 equal divisions and a screw gauge with 100 divisions on its circular scale. In the Vernier callipers, 5 divisions of the Vernier scale coincide with 4 divisions on the main scale and in the screw gauge, one complete rotation of the circular scale moves it by two divisions on the linear scale. Then:

- (A) If the pitch of the screw gauge is twice the least count of the Vernier callipers, the least count of the screw gauge is 0.01 mm.
- (B) If the pitch of the screw gauge is twice the least count of the Vernier callipers, the least count of the screw gauge is 0.005 mm.
- (C) If the least count of the linear scale of the screw gauge is twice the least count of the Vernier callipers, the least count of the screw gauge is 0.01 mm.
- (D) If the least count of the linear scale of the screw gauge is twice the least count of the Vernier callipers, the least count of the screw gauge is 0.005 mm.

**Answer:** For **Vernier calliper**

$$1 \text{ Main Scale Division (MSD)} = \frac{1}{8}, \quad 1 \text{ MSD} = \frac{1}{8}$$

Given 5 divisions of the Vernier scale coincide with 4 divisions on the main scale i.e.  $4 \text{ MSD} = 5 \text{ VSD}$   
 We know Least Count of vernier scale

$$\text{L.C of Vernier Calliper} = 1\text{MSD} - 1\text{VSD} = 1\text{MSD} - \frac{4}{5}\text{MSD} = \frac{1}{5}\text{MSD} = 0.2\text{MSD} = 0.2 \times \frac{1}{8} = \frac{1}{40}$$

**Screw gauge:**

100 div of Circular Scale = 2 div of linear scale

Lets evaluate (A) / (B)

Pitch of screw gauge = 100 division of circular scale

$$[\text{Distance moved by mark when 1 complete rotation done to circular scale}] = \text{Twice LC} = 2 \times \frac{1}{40}$$

$$\text{LC} = 100 \text{ div of circular scale} = \frac{1}{20} \times \frac{1}{100} = 0.005 - \text{option B is correct}$$

**To evaluate C and D:**

LC of linear scale of screw gauge = 1 div of linear scale = 2 LC of Vernier calliper

$$100 \text{ Div of circular scale} = \frac{1}{20} \times 2 \text{ or } \text{LC} = \frac{1}{1000} = 0.001 \text{ cm} = 0.01 \text{ mm}$$

Option (C) is also correct

**Therefore correct option is (B) and (C)**