

Sharjah Indian School – Boys Wing
PRACTICAL PHYSICS-XI

EXPERIMENT 1

AIM

To measure diameter of a small spherical body, using vernier callipers.

APPARATUS

Vernier callipers, a spherical body (pendulum bob).

THEORY

If with the body between the jaws, the zero of vernier scale lies ahead of N th division of main scale, then main scale reading (M.S.R.) = N .

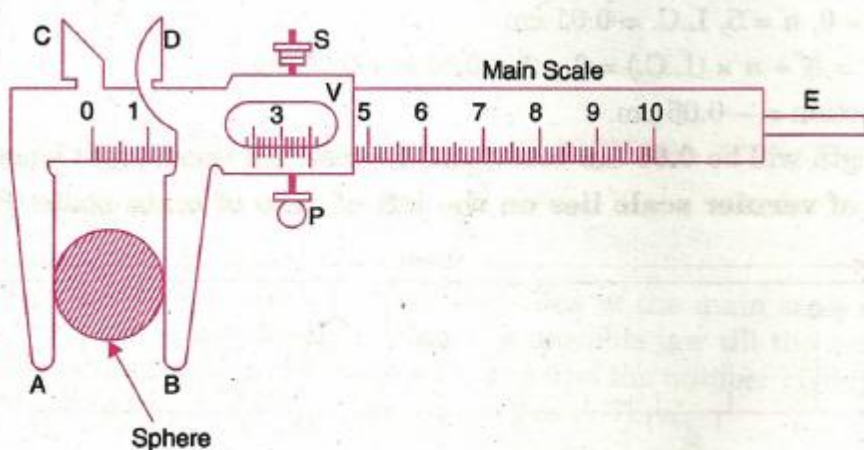
If n th division of vernier scale coincides with any division of main scale, then Vernier scale reading (V.S.R.)

= $n \times (\text{L.C.})$ where L.C. is least count of vernier callipers.

= $n \times (\text{V.C.})$ where V.C. is vernier constant of vernier callipers

Total reading, T.R. = M.S.R. + V.S.R. = $N + n \times (\text{V.C.})$.

DIAGRAM



Vernier callipers measuring diameter of a sphere.

PROCEDURE

1. Determine the vernier constant (V.C.) *i.e.* least count (L.C.) of the vernier callipers and record it stepwise.
2. Bring the movable jaw BD in close contact with the fixed-jaw AC and find the zeroerror. Do it three times and record them. If there is no zero error, then record 'zero error nil'.
3. Open the jaws, place the sphere or cylinder between the two jaws A and B and adjust the jaw DB, such that it gently grips the body without any undue pressure on it. Tight the screw S attached to the vernier scale V.
4. Note the position of the zero mark of the vernier scale on the main scale. Record the main scale reading just before the zero mark of the vernier scale. This reading (N) is called main scale reading (M.S.R.).

5. Note the number (n) of the vernier scale division which coincides with some division of the main scale.

6. Repeat steps 4 and 5 after rotating the body by 90° for measuring the diameter in a perpendicular direction .

7. Repeat steps 3, 4, 5 and 6 for three different positions. Record the observations in each set in a tabular form.

8. Find total reading and apply zero correction.

9. Take mean of different values of diameter and show that in the result with proper unit

OBSERVATIONS

Vernier Constant (Least Count) of the Vernier Callipers

1 M.S.D. = 1 mm , No. of V.S.D = 10

Vernier Constant, V.C. = $\frac{1\text{M.S.D.}}{\text{No. of V.S.D}}$

To measure the diameter (*D*)

Serial No.	Main Scale Reading (<i>N</i>)	Vernier Scale Reading (<i>n</i> × V.C)	Total Reading

CALCULATIONS

Mean diameter = cm

RESULT

The diameter of the given sphere/cylinder iscm.

PRECAUTIONS

1. Motion of vernier scale on main scale should be made smooth .
2. Vernier constant and zero error should be carefully found and properly recorded.
3. The body should be gripped between the jaws firmly but gently.
4. Observations should be taken at right angles at one place and taken at least as three different places.

SOURCES OF ERROR

1. The vernier scale may be loose on main scale.
2. The jaws may not be at right angles to the main scale.

EXPERIMENT 2

AIM

To measure internal diameter and depth of a given calorimeter, using vernier callipers.

APPARATUS

Vernier callipers, a calorimeter.

THEORY

If with the body between the jaws, the zero of vernier scale lies ahead of N th division of main scale, then main scale reading (M.S.R.) = N .

If n th division of vernier scale coincides with any division of main scale, then vernier scale reading (V.S.R.)

= $n \times$ (L.C.) where L.C. is least count of vernier callipers.

= $n \times$ (V.C.) where V.C. is vernier constant of vernier callipers.

Total reading, T.R. = M.S.R. + V.S.R.

= $N + n \times$ (V.C.)

PROCEDURE

1. Determine the vernier constant (V.C.) *i.e.* least count (L.C.) of the vernier callipers and record it stepwise.

2. Bring the movable jaw BD in close contact with the fixed-jaw AC and find the zero error.

Measurement of internal diameter

3. Put the jaws C and D inside the calorimeter and open them till each of them touches the inner wall of the calorimeter, without any undue pressure on the walls.

Tight the screw S attached to the vernier scale V.

4. Note the position of the zero mark of the vernier scale on the main scale. Record the main scale reading just before the zero mark of the vernier scale. This reading (N) is called main scale reading (M.S.R.).

5. Note the number (n) of the vernier scale division which coincides with some division of the main scale.

6. Repeat steps 4 and 5 after rotating the body by 90° for measuring internal diameter in a perpendicular direction.

7. Repeat steps 3, 4, 5 and 6 for four different positions. Record the observations in each set in a tabular form.

8. Find total reading and apply zero correction.

9. Take mean of different values of internal diameter and show that in the result with proper unit.

Measurement of depth

10. Keep the edge of the main scale strip M on the upper edge of the calorimeter.

11. Press the jaw BD downwards so that the thin metallic strip E on the back side of M moves downward. Continue it till the outer edge of E touches the bottom of the calorimeter.

12. Repeat steps 4 and 5 for four different positions along the circumference of the upper edge of the calorimeter.
13. Find total reading and apply zero correction.
14. Take mean of different values of depth and show that in the result with proper unit .

OBSERVATIONS

Vernier Constant (Least Count) of the Vernier Callipers

1 M.S.D. = 1 mm , No. of V.S.D = 10

$$\text{Vernier Constant, V.C.} = \frac{1\text{M.S.D}}{\text{No.of V.S.D}}$$

To measure internal diameter

<i>Serial No.</i>	<i>Main Scale Reading (N)</i>	<i>Vernier Scale Reading (n × V.C)</i>	<i>Total Reading (T.R=M.S.R+V.S.R)</i>

To measure depth

<i>Serial No.</i>	<i>Main Scale Reading (N)</i>	<i>Vernier Scale Reading (n × V.C)</i>	<i>Total Reading (T.R=M.S.R+V.S.R)</i>

CALCULATIONS

Mean internal diameter = cm

Mean depth = cm

RESULT

The internal diameter and depth of the given calorimeter iscm.

PRECAUTIONS

1. Motion of vernier scale on main scale should be made smooth .
2. Vernier constant and zero error should be carefully found and properly recorded.
3. The body should be gripped between the jaws firmly but gently.
4. Observations should be taken at right angles at one place and taken at least as three different places.

SOURCES OF ERROR

1. The vernier scale may be loose on main scale.
2. The jaws may not be at right angles to the main scale.

