M E S INDIAN SCHOOL, DOHA-QATAR

BOYS' SECTION

EXPERIMENTS FOR CLASS XI(CBSE) 2016-17

EXPERIMENT NO:1

VERNIER CALLIPERS

Aim: To find the volume of rectangular block by using a vernier callipers.

Apparatus: Vernier caliper,rectangular block and magnifying glass.

Theory: (a) volume of the rectangular block(V),

$V=lbh$ in m^3

Where l=length of the block in m

b=breadth of the block (in m)

h=height of the block (in m)

Volume of the sphere, $V=(4/3)\Pi r^3$ (in m^3)

Where r=radius of the sphere (in m)

Least count: It is the smallest measurement that which any measuring instrument can measure accurately(value of one division=L.C.)

Observations and calculations:

Least count=Value of one main scale division/Total no: of vernier scale divisions

L.C.=1div/10=1mm/10=0.1mm

L.C.=0.01cm

1) To find length,breadth and height of a rectangular block

Slno:	Dimensions	M.S.R.(cm)	VSR(div)	VSRxL.C. (cm)	Total=MSR+ (VSRxLC) (cm)	Mean (cm)
1 2 3 4	Length(l)					l=
1 2 3 4	Breadth(b)					b=
1 2 3 4	Height(h)					h=

Volume of the rectangular block=lbh

V = cm^3

V= m^3

(2) To find the diameter of the sphere

Slno:	Dimension	MSR (cm)	VSR (div)	(VSRxLC) (cm)	Diameter,d=MSR+ (VSRxLC) (cm)
1 2 3 4 5	Diameter (d)				
					Mean d= cm

Radius of the sphere,r=d/2

= cm

Volume of the sphere,V=(4/3) Πr^3

=----------cm^3

=---------- m^3

Procedure:

1. Calculate the LC of vernier calipers.
2. Measure length,breadth&thickness of a rectangular block and diameter of the given sphere by using vernier calipers.
3. Find MSR and VSR for each physical quantity.
4. Calculate the total reading by using the formula MSR+(VSRxLC) .
5. Find the volume of block using the equation V=lbh& volume of the sphere V==(4/3) Πr^3
6. Repeat the experiment 4 or 5 times.

Precautions:

1. The movement of vernier scale on main scale should be smooth
2. Take measurements of diameter by changing the orientation of the body
3. Notice the readings carefully to avoid error due to parallax

Sources of error

1. In poor quality of vernier calipers jaws may not be perpendicular to scales
2. Parallax may be there in taking the observations

Result: Volume of the rectangular block,V= ----------m^3

Volume of the sphere,v= ---------- m^3

Experiment no:2
SCREW GAUGE

Aim: To find the thickness of the given wire and sphere using a screw gauge and hence to find their volumes.

Apparatus: Screw gauge, thin wire, small sphere and meter scale.

Theory: (a) Volume of the given wire= $\Pi r^2 h$ in m^3

Where r=radius of the wire (in m)
h=length of the wire. (in m)

(b) Volume of the sphere=$(4/3)\ \Pi r^3$ (m^3)
Where r=radius of the sphere (in m)

Observations and calculations

Least count: It is the smallest measurement that which any measuring instrument can measure accurately (value of one division=L.C.)
Zero error=----------div

Pitch of the screw =distance moved/no: of rotations made
=4mm/4
=1mm

Least count(LC) =Pitch of the screw/Total no of circular scale divisions
=1mm/100
=0.01mm

Length of the given wire,h= ---------- cm
= --------- mm

(1) To find the diameter (thickness) of the given wire

Slno:	PSR(mm)	HSR(div)	CHSR(div)	CHSRxLC (mm)	Diameter,d=PSR+ (CHSRx LC) (mm)
1 2 3 4 5 6					
					Mean d= mm

Radius of the wire,r=d/2= -------- mm

Volume of the wire,V= $\Pi r^2 h$

=----------

= ---------- mm^3

= ---------- m^3

(2) To find the diameter of the sphere

slno	PSR(mm)	HSR(div)	CHSR(div)	CHSRxLC (mm)	Diameter,d= PSR+(CHSRxLC) (mm)
1 2 3 4 5					
					Mean d= mm

Radius of the sphere,r=d/2

= ---------- mm

Volume of the sphere,V=(4/3) Πr^3

=---------- mm^3

=---------- mm^3

= ---------- m^3

Procedure:

1. Measure the Zero correction and least count of screw gauge.
2. Measure the diameter of the given wire and sphere using screw gauge.
3. Find PSR,HSR and CHSR using screw gauge.
4. Calculate PSR+(CHSRxLC).
5. Measure the length of the given wire by using metre scale.
6. Find volume of wire and sphere using the formulae V= $\Pi r^2 h$& V=(4/3) Πr^3
7. Repeat the experiment 4 or 5 times.

Precautions

1. At a time rotate the screw in one direction to avoid backlash error
2. Zero error should be observed carefully and taken into consideration

Sources of error

1. The wire may not be of uniform cross section
2. Backlash error always exists because it cannot be removed completely

Result: (a) Diameter of the given wire,d= -------- m

Volume of the wire,V = ---------- m^3

(b) Diameter of the sphere,d = ---------- m

Volume of the sphere,V = ---------- m^3

Experiment no:3
SPHEROMETER

Aim: To find the focal length of a convex mirror using a spherometer

Apparatus: a spherometer,a plane glass plate,a convex mirror and a metre scale.

Theory: Radius of curvature of a spherical surface can be determined by using the formula,

$R=(l^2/6h)+(h/2)$ in cm

Focal length,$f=R/2$

Where l= distance between the legs of the spherometer (in cm)

h= the difference between the reading on the curved surface and the plane glass plate. (in cm)

R=radius of curvature of the convex mirror in cm.

f =focal length of the convex mirror (in cm)

Observations and calculations

Pitch =distance moved/no: of rotations made

= -------- mm

Least count(LC)=Pitch /Total no of circular scale divisions

=--------

= --------- mm

(1) To find the reading on the convex surface

Slno	MSR(mm)	CSR(div)	CSRxLC (mm)	h_1=MSR+ (CSRxLC) (mm)	Mean h_1 (mm)
1 2 3 4					

(2) To find the reading on the glass plate

Slno	MSR(mm)	CSR(div)	CSRxLC (mm)	h_2=MSR+ (CSRxLC) (mm)	Mean h_2 (mm)
1 2 3 4					

calculations

$h=(h_2-h_1)$

$l=(l_1+l_2+l_3)/3$=----------cm

=---------- cm

$R=(l^2/6h)+(h/2)$

= -------- mm

= ---------- cm

Focal length,f=R/2

= cm

Procedure:

1. Measure least count of spherometer..
2. Measure the readings on the glassplate(h_2)and convex mirror (h_1)using spherometer..
3. Find MSR&CSR using spherometer.
4. Calculate MSR+(CSRxLC).
5. Find $h=(h_2-h_1)$&$l=(l_1+l_2+l_3)/3$.
6. Calculate the radius of curvature using the formula $R=(l^2/6h)+(h/2)$.
7. Find focal length of the convex mirror using f=R/2.
8. Repeat the experiment 4 times.

Precautions

1. The central screw should just touch the plane or curved surface
2. The distance between the legs should be measured accurately

Sources of error

Result: Focal length of the convex mirror,f= cm

Experiment no:4
SIMPLE PENDULUM

Aim: To find the value of acceleration due to gravity(g) using a simple pendulum

Apparatus: simple pendulum bob,iron stand&clamps,thread,metre scale,stop watch and cork.

Theory: Acceleration due to gravity, $g=4\Pi^2(L/T^2)$

Where L= length of the pendulum

T= time period of the pendulum

Observations and calculations

(1) To find (L/T^2)

slno	Length,L (m)	Time for 20 Oscillations,t(s)			Time period, T=(t/20) (S)	T^2 (s^2)	(L/T^2) (m/s^2)	Mean (L/T^2) (m/s^2)
		1	2	Mean t				
1 2 3 4 5								

Acceleration due to gravity, $g=4\Pi^2(L/T^2)$

=

= m/s^2

Procedure:

1. Measure the distance between the point of suspension and centre of the bob,this gives the length of the pendulum(L).
2. Measure the time taken for 20 oscillations using a stopwatch at least 2 times.
3. Calculate the time period(T).
4. Find (L/T^2).
5. Calculate acceleration due to gravity by using the formula $g=4\Pi^2(L/T^2)$ experimentally.
6. Calculate g graphically from (T^2-L) graph.
7. Repeat the experiment at least 5 times.

Precautions: from lab manual

Result: Acceleration due to gravity(by experiment),g= m/s^2

Acceleration due to gravity(graphical method),g= m/s^2

Experiment no:5
PARALLELOGRAM LAW OF VECTORS

Aim: To find the unknown weight of a given body using parallelogram law of vectors

Apparatus: A vertical wooden board with two pulleys,slotted weights with two weight hangers,strings,sheets of paper,pins etc.

Theory: When two forces acting simultaneouslyat a point are separated in magnitude and direction by two adjacent sides of a parallelogram,then, their resultant is represented in both magnitude anddirection along the diagonal of the parallelogram passing through the point of intersection of the two forces.

Magnitude of resultant force,$R=(P^2+Q^2+2PQ\cos\theta)^{1/2}$

Observations and calculations

Weight of the given object(by spring balance) = g

Scale(s): 1cm=50g

To find unknown weight of the object

slno	Force,P		Force,Q		Length of OC=R (cm)	Unknown weight, W=Rxs (gwt.)
	Weight in (gwt.)	OA (cm)	Weight in (gwt)	OB (cm)		
1 2 3						
						Mean W= gwt

Procedure:

1. Take a vertical wooden board with two pulleysand slotted weights with two weight hangers.
2. Fix a white sheet on the wooden board using pins.
3. Tie the given body at the middle part of the string.
4. Place a minor strip lengthwise under the thread on side from the junction knot and mark the positions with a fine tipped pencil.
5. Similarly also note down the position of thread on remaining two sides of the knot and detach the paper from the board.
6. Select a suitable scale for representing weights in terms of length and construct a parallelogram.
7. Measure the length of diagonal and convert it into force with the help of scale already chosen.
8. Repeat the experiment for at least 3 sets of weights.

Precautions: from lab manual

Result: The unknown weight of the given body by parallelogram law of vectors = gwt