

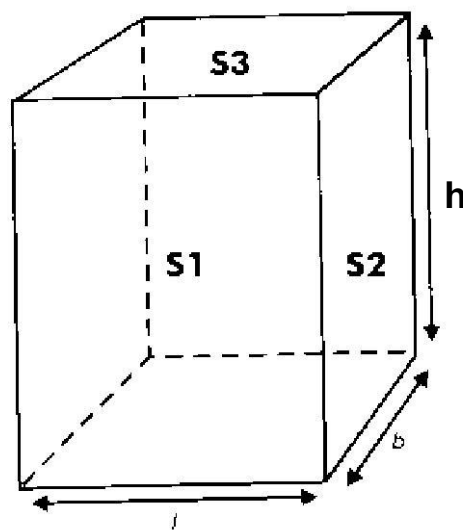
Class IX

EXPERIMENT No: 4

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AIM: To observe and compare pressure exerted by a solid iron cuboid on fine sand/ wheat flour while resting on its three different faces and to calculate the pressure exerted in the three different cases.

APPARATUS/ MATERIALS REQUIRED: Spring balance, cuboid, tray to hold sand, sand, scale



PROCEDURE:

1. With the help of spring balance find the mass of the cuboid. Take three observations and find the mean value. Calculate weight = mg ($g = 9.8\text{m/s}^2$)
2. Find the length (l), breadth (b) and height (h) of the cuboid by taking three observations of each and then taking their mean.
3. Mark three pairs of opposite surfaces as S_1 , S_2 and S_3 as shown in the figure.
4. Calculate the surface areas as $S_1=lh$; $S_2 =bh$; $S_3 =lb$
5. Place the tray on the horizontal surface, put 2 inch thick layer of sand in it and flatten the surface of the sand.
6. Gently place the cuboid vertically on the sand such that the surface S_1 is on the sand.
7. Remove the cuboid and using the scale find the depth of the depression caused and record it. Repeat it two times after flattening the surface and take the mean. Record this mean as d_1 .
8. Repeat the steps 6 and 7 so that surface S_2 and S_3 are on the surface of the loose sand. Record the depths of depression as d_2 and d_3 .

9. Calculate the pressures P_1 , P_2 and P_3 for the surfaces S_1 , S_2 and S_3 respectively by dividing the weight of the cuboid by the surface areas of contact.
10. Compare the calculated values of pressures and depths.

Observations:

1. For mass of cuboid
 Observation 1 : $m_1 =$
 Observation 2 : $m_2 =$
 Observation 3 : $m_3 =$
 Mean value of the mass, $m = (m_1+m_2+m_3)/3 = \dots\dots\dots g$
 Weight of the cuboid , $W = mg$
2. For dimensions of the cuboid

Observation No.	Length (l)	Breadth (b)	Height (h)
1	$l_1 =$	$b_1 =$	$h_1 =$
2	$l_2 =$	$b_2 =$	$h_2 =$
3	$l_3 =$	$b_3 =$	$h_3 =$
Mean	$l = (l_1+l_2+l_3)/3$	$\frac{b = (b_1+b_2+b_3)}{3}$	$h = (h_1+h_2+h_3)/3$

Calculation of surface area and pressure : www.jsuniltutorial.weebly.com/

$S_1 = lh$; $P_1 = W / S_1 = \dots\dots\dots$

$S_2 = bh$; $P_2 = W / S_2 = \dots\dots\dots$

$S_3 = lb$; $P_3 = W / S_3 = \dots\dots\dots$

4. For depression caused in the sand

S. No.	Surface	Depth of Depression Caused		Mean depth	Corresponding pressures
		Observation I	Observation II		
1.	For Surface S_1 (l x h)	d_1	d_1	d_1	$p_1 =$
2.	For Surface S_2 (b x h)	d_2	d_2	d_2	$p_2 =$
3.	For Surface S_3 (l x b)	d_3	d_3	d_3	$p_3 =$

Inference :

We have seen that the depth for surface _____ is maximum and for surface _____ is minimum.

Therefore, it is concluded that as the area of the bottom surface decreases the pressure on the sand increases.

PRECAUTIONS:

1. The sand should be leveled properly after every reading.
2. The block should be placed on the sand very gently, without applying any extra pressure.
3. The block has to be placed vertically.
4. The scale while measuring the depression should just touch the bottom of the depression.
5. The dimensions of the cuboid should be uniform.