

4.1.3: Procedure

Part A: Calculating Force and Pressure

1. Calculate the expected force for the 1000 g (1 kilogram) mass based on the acceleration due to Earth's gravity and record in Table 1.
2. Repeat step one for the 500 g and 200 g masses.
3. Measure the diameter of the 1000 g mass. Calculate the resulting area ($area = \pi r^2$) and record in table two. Using the force computed in Table 1, calculate and enter the resulting pressure in Table 2.
4. Repeat step three for the 500 g and 200 g masses.

Part B: Observing Pressure via Deformation

5. A simple qualitative way of observing pressure is to note the deformation of a semi-soft material. In this exercise, a slab of foam rubber will serve this purpose. Simply place the 1000 g mass on the slab and note the degree of deformation (none, slight, moderate, etc.). Enter your observation in the final column of Table 2
6. Repeat step five for the 500 g and 200 g masses.
7. Using the same force, pressure may be increased or decreased by decreasing or increasing the area, respectively. To increase the effective area, a metal plate may be introduced between the mass and foam rubber. Calculate the area of the plate, and based on this value, calculate the new pressures for the three masses and enter these data in Table 3.
8. Place the metal plate on the foam rubber and position the 1000 g mass in its center. Note the degree of deformation of the foam rubber and record in Table 3.
9. Repeat step five for the 500 g and 200 g masses.
10. To illustrate the effect of decreasing the area, place the plate on the foam rubber on edge, that is, the plate should be perpendicular to the foam rubber. Carefully balance the 1000 g mass on the top edge of the plate (you will have to steady it with your hands) and note the deformation. The area in this instance is the area of the edge of the plate, and thus very, very small compared to the plate face or the bottom of the mass. (This observation is sufficient and there is no need to attempt to measure the area of this edge.)

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