Class:

Pressure

Pressure is the amount of force exerted per unit area on a surface that is perpendicular to the force. In mathematical terms:

$$Pressure = \frac{Force}{Area}$$

Pressure is measured in Pascals, where 1 Pascal is 1 Newton per square meter. More commonly used is the Kilopascal, which is 1000 Newtons per square meter.

For example, if a person has a weight of 490 N (50 kg x 9.8 N/kg – this is gravitational force) and their feet take up an area of 400 cm², then the pressure they exert on the ground may be calculated as follows:

Force = 490 N Area = 400 cm² = 0.04 m² Pressure = ? Pressure = $\frac{Force}{Area}$ \therefore The pressure on the ground would be 12.25 kPa. Pressure = $\frac{490N}{0.04m^2}$ Pressure = $12250\frac{N}{m^2}$ Pressure = 12.25kPa

Complete the following questions related to pressure.

1. A block, resting on the ground, has a cross sectional area of 2 m² is being pushed with a force of 100 N. What is the pressure exerted by the block on the ground?

2. An aquarium holds 100 L of water (recall that 1 L of water has a mass of 1 kg). The base of the aquarium is 1 m by 0.5 m. What pressure is exerted on a table by the filled aquarium?

3. Tom's hand print is 30 cm² but Sean's handprint is only 20 cm². If Tom is able to push with a force of 70 N and Sean can push with a force of 50 N, who can exert a larger pressure on an object?

4. If a box is applying 24 kPa of pressure on a table and the area of the box is 80cm², what must the weight of the box be?