

N5

Pressure

Pressure can be described as the force exerted on a surface per one metre squared.

The greater the force on 1 m², the greater the pressure exerted on the surface and vice versa.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$
$$P = \frac{F}{A}$$

← Newtons, N

← metre squared, m²

↗ Newtons per metre squared, N/m²

Pressure is measured in units of Newtons per metre squared, N/m² or Pascals, Pa.

Remember: when calculating the total pressure at a depth in water, you must take into account the pressure due to the atmosphere = 1 x 10⁵ Pa.

Example 1

A box has a weight of 650 N and has dimensions 0.5m by 2m, what pressure is exerted on the floor?

$$F = 650 \text{ N}$$

$$A = (0.5 \times 2) \text{ m}^2 = 1 \text{ m}^2$$

$$P = ?$$

$$P = \frac{F}{A}$$

$$P = \frac{650}{1}$$

$$P = 650 \text{ N/m}^2$$

Example 2

A girl has a mass of 40kg, her shoes have dimensions 0.25 m by 0.1 m, what pressure does she exert on the with one foot?

$$F = W = m \times g = 40 \times 10 = 400 \text{ N}$$

$$A = 0.25 \times 0.1 = 0.025 \text{ m}^2$$

$$P = ?$$

$$P = \frac{F}{A}$$

$$P = \frac{400}{0.025}$$

$$P = 16\,000 \text{ N/m}^2$$

Think: when is the *pressure* of the girl on the floor at *its greatest*? On 1 foot or 2?

