Pressure

In this knowledge organiser, you will learn about the concept of Pressure and how to use the relationship between Pressure, Force and Area.

Check that you can:

- *calculate the Area of 2D shapes.*

Pressure

Pressure is the Force that is produced when something presses or pushes against something else, and is the Force applied to each unit of Area.

In order to calculate the **Pressure**, we must **divide the Force of the object by the Area**.

The units of Pressure are $\mathrm{N/m^2}$ or $\mathrm{N/cm^2}$.

Force (F) is measured in newtons (N).

Area (A) is measured in metres squared $(\mathrm{m^2})$.

Example:

A snowboard exerts a Force of $300\ \mathrm{N}$ on the snow. The surface Area of a snowboard is $0{\cdot}5\ \mathrm{m^2}$. Calculate the Pressure, in $\mathrm{N/m^2}$, that the snowboard exerts on the snow.

Answer:

Using the formula:

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

$$\text{Pressure} = \frac{300\ \mathrm{N}}{0{\cdot}5\ \mathrm{m^2}} = 600\ \mathrm{N/m^2}$$

Area

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

Example:

A crate exerts a Force of $150\ \mathrm{N}$ on a table. The Pressure exerted on the table is $0{\cdot}5\ \mathrm{N/cm^2}$. Calculate the Area of the table in contact with the crate.

Answer:

Using the formula:

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

$$\text{Area} = \frac{150\ \mathrm{N}}{0{\cdot}5\ \mathrm{N/cm^2}} = 300\ \mathrm{cm^2}$$

Force

$$\text{Force} = \text{Pressure} \times \text{Area}$$

Example:

A television is placed on a television stand. The Area of the stand in contact with the television is $60\ \mathrm{cm^2}$. The Pressure on the stand is $8\ \mathrm{N/cm^2}$. How much Force is being exerted by the television on the stand?

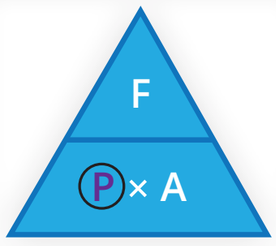
Answer:

Using the formula:

$$\text{Force} = \text{Pressure} \times \text{Area}$$

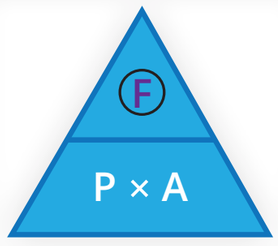
$$\text{Force} = 8\ \mathrm{N/cm^2} \times 60\ \mathrm{cm^2} = 480\ \mathrm{N}$$

Calculating Pressure



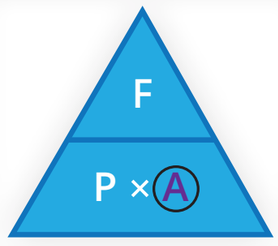
$$\mathrm{P} = \frac{\mathrm{F}}{\mathrm{A}}$$

Calculating Force



$$\mathrm{F} = \mathrm{P} \times \mathrm{A}$$

Calculating Area



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

REMEMBER!

Make sure the units are the same as in the question, i.e. that the Area is $\mathbf{cm^2}$ if the Pressure is in $\mathbf{N/cm^2}$.