

Pressure

The definition of pressure is the applied force divided by the area on which the force acts.

SI Units

- Force is measured in Newtons, N.
- Area is measured in metres squared, m^2 .
- Pressure is therefore Newtons per metre squared, Nm^{-2} .

The units of pressure are given their own name, the Pascal, Pa.

$$1 \text{ Nm}^{-2} = 1 \text{ Pa}$$

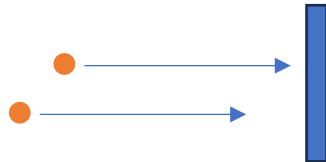
Example: Determine the pressure when a force of 100 N acts on an area of 0.01 m^2 .

$$\text{Pressure} = \text{force/area} = 100/0.01 = 10,000 \text{ Nm}^{-2}$$

$$\text{Hence pressure} = 10,000 \text{ Pa} = 10\text{kPa}$$

Air pressure

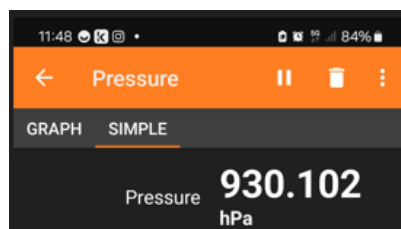
Air pressure is caused by the particles of air colliding with the walls of the container. Air pressure acts in all directions. Each air particle strikes the surface and creates a force that pushes the wall.



The total of these small forces gives the total force applied. When this is divided by the area it gives the pressure.

We can never measure the number of collisions occurring on the surface, but we can measure the air pressure, as it acts in all directions. The Phyphox application on Android phones does this for us.

Today (21.03.25) in ICS



The measure is in hPa where $1 \text{ hPa} = 100 \text{ Pa}$ (normal atmospheric pressure = $1000 \text{ hPa} = 100 \text{ kPa}$)

Investigation

Research question: How much pressure do you apply on the floor when standing on two feet?

Hypothesis: The greater a person's mass, the higher the pressure on the floor.

Instructions

1. Remove one shoe and trace around it using the squared paper.
2. Count the number of small squares within the shoe print.
3. Weigh yourself using the balance. The force due to gravity = mass (kg) x 9.81 (acceleration due to gravity)
4. Share your results with four other people.

Data recording

Record all data here in a suitable table (you could use Excel and then copy paste)

Data analysis

Choose a suitable strategy for analysing your data

Conclusion

What are your findings – can you answer the research question?

Is the hypothesis supported completely, or are there any weaknesses?

Are there any discrepancies in the data produced by this method?

Evaluation

Does the method have any weaknesses?

Can you suggest any improvements?