

Why getting stepped on by running shoes does not hurt just as much as when we are stepped on by a heeled shoe?
Why do cars easily spin on wet roads?



[Credit: Wikimedia Commons]

DO YOU KNOW?

- **Pressure** is the force exerted on a given area.
Given the same force, the smaller the area of contact, the more pressure is applied.
- The formula used to describe & calculate pressure is \rightarrow
- Unit for pressure is Pascal, Pa [same as newton per square metre].

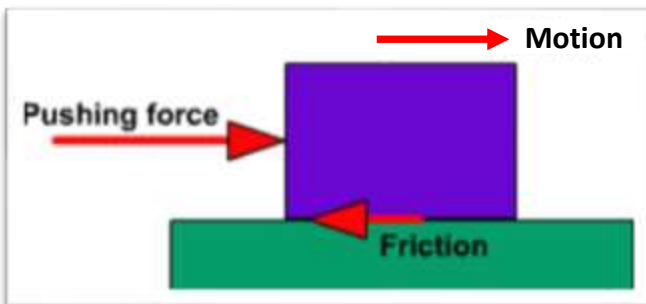
$$\text{Pressure} = \frac{\text{force}}{\text{area}}$$

pressure in Pascal
force in Newton
area in metres squared (m²)

- **Traction** is the force that causes a moving thing to 'stick' against the surface it is moving along.



[Credit: Wikimedia Commons]



- **Friction** is the resistance to movement between any two objects when placed in contact with each other:
 - Causes wear & heat.
 - In an engine, it robs it of some of its potential power.
 - Not constant but depends on the materials, type of surface finish, amount of pressure holding the two objects together & the relative amount of movement between the objects.



DIY

Experiment 1

If you held a thumb tack & pressed it the wrong way, what will happen?

[**Note:** Do not press the pointed part too hard.]



[Credit: Wikimedia Commons]

Force distributed over a wider area:
Lower pressure

Force distributed to one point:
Higher pressure

Now use a balloon and press different ends of the thumb tack on it.



[Credit: Wikimedia Commons]

Experiment 2

If you were offered to sit on a bed of nails, would you? Your first thought would be, it's going to be very painful!

• Alternatively you could use a balloon. Watch the video below and try this experiment.

[**Note:** Be very careful when trying out this experiment. Use only balloons.]

Physics project: Balloon on bed of nails:

<https://youtu.be/jgCmwh2galo>

Experiment 3

- Visit some shoe stores and explore the various types of shoes and their functions.

Discussion

[These questions encourage you to explore. No answers are provided.]

- Why do we use shoes (footwear)?
- Why do we need traction?
- The current F1 Grand Prix has a range of five dry-weather tyres from a single supplier. Why 5 types of tyres?
- Why are there different soles for different types of activities?
- Will using the 'wrong' shoes affect our performance in a particular competitive sport?

Keywords: Pressure, force, area, traction, friction

