Design & Technology

Advent 2

Moving Mechanisms

State of matter

There are three states of matter: solid, liquid and gas. In each state, the particles are arranged differently.

Solid

In a solid, particles are arranged in a regular pattern and packed tightly together. This means that solids keep their shape and cannot be compressed.

Liquid

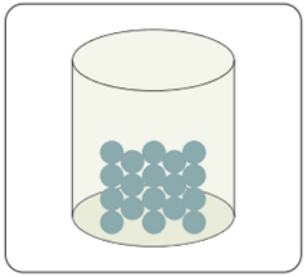
In a liquid, the particles are arranged randomly and close together. There are a few gaps between particles, but liquids cannot be compressed.

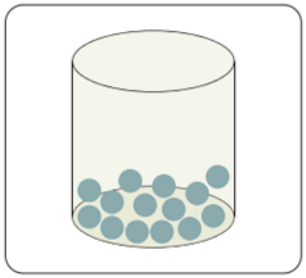
Gas

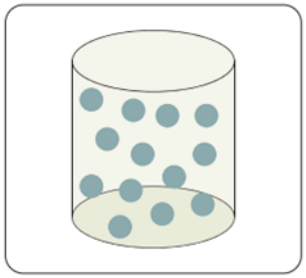
In a gas, the particles are arranged randomly and are far apart. This means that gases can be compressed

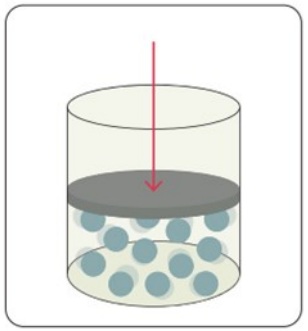
Air pressure

As particles in the air move in any direction, they bump into each other and the sides of their container. Every time an air particle bumps into the side of a container, it creates air pressure. The more often particles hit the container sides, the higher the air pressure. Air pressure can be increased by squashing, or compressing, air into a smaller space.







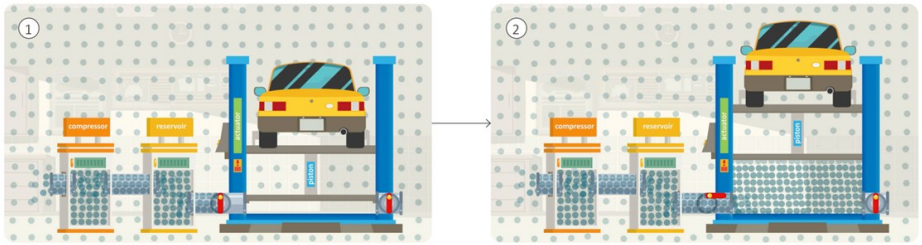


Pneumatics

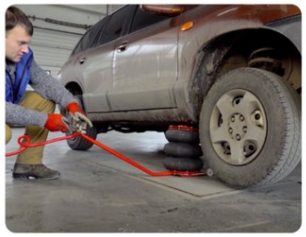
Compressing air increases air pressure and the amount of energy stored in it. This stored energy can be put to practical use to make things move. This is called pneumatics. The energy in the compressed air can be used to do work, such as making a piston move. This car lift uses a piston mechanism.

Air is sucked from the atmosphere and squashed in a compressor. The compressed air is stored under high pressure in a reservoir. When the in valve between the reservoir and the actuator is closed, air cannot move out of the reservoir and the piston remains down.

When the in valve is opened, the air under high pressure moves into the actuator and forces the piston to rise, lifting the car up. The air is released through the out valve to lower the piston back down again.



Machines use pneumatics to create the force needed to lift vehicles, force paint out at high speed and break up pavements



Design & Technology

Advent 2

Glossary

Actuator

Part of a machine that moves something.

Compress

To press something into a smaller space.

Particle

A single piece of matter too small to be seen

Air pressure

The force exerted by air, whether compressed or unconfined, on any surface in contact with it.

Solid

Firm and stable in shape; not liquid or fluid.

Liquid

A substance that flows freely but is of constant volume, having a consistency like that of water or oil.

Gas

A substance or matter in a state in which it will expand freely to fill the whole of a container, having no fixed shape (unlike a solid) and no fixed volume (unlike a liquid)

Pneumatic

Containing or operated by air or gas under pressure.