

p 469 (1,2,3,4,5,6)

1. A force is a push or a pull.



Force is measured in newtons (N)

Pressure is the amount of force applied to a specified area.

2. $1 \text{ Pa} = 1 \text{ N/m}^2$

3. When you exert force on a closed container, the pressure increases.

4. Inside a closed system, pressure acts equally in all directions through all parts of the system.

5. jacks front-end loader
lifts fork lifts
pumps compactors
brakes jaws of life.

6. 4 x as big.

Mechanical advantage of 4.

Hydraulics vs Pneumatics

Hydraulic devices are usually based on closed systems (the liquid can not escape),

while pneumatic devices most often use **open** systems (the gas can escape)

Pneumatic devices can alter the pressure of the air they release by controlling the size of the opening that lets out the gas .

Smaller opening \rightarrow increased pressure.
larger opening \rightarrow lower pressure

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

Many pneumatic devices require compressed air for their operation. A gas that has been compressed will expand when released.

This expansion action allows the gas to exert a great deal of force.

Read p 470 - 477
p 477 (1-3)

p477

1. Gases are compressed when pressure is applied, whereas liquids are not.
2. Pneumatic systems are usually open systems, whereas hydraulic systems are usually closed systems.

As well, gases usually must be compressed before they can do work. Liquids in a closed system can do work as soon as the force is applied to them.

3. Some possible examples are:

jackhammer

air rifle

water gun

paintball gun