Key words

area
force
hydraulic jack
hydraulics
piston
pressure
valve

More complicated machines 2

- Liquids are almost incompressible and transmit *pressure* applied to them. They are used in *hydraulic* machines.

1 Hydraulic jack

- On the downstroke the *valve* from the fluid reservoir is closed and the valve into the jack cylinder is open. Fluid is forced from the pump cylinder to the jack cylinder by the pump *piston*. This forces up the jack piston.
- On the upstroke the valve leading to the jack cylinder closes. The pressure in the pump cylinder falls and atmospheric pressure forces the valve from the fluid reservoir to open. Atmospheric pressure forces fluid into the pump cylinder.
- Pressure, *force* and *area* are related.

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

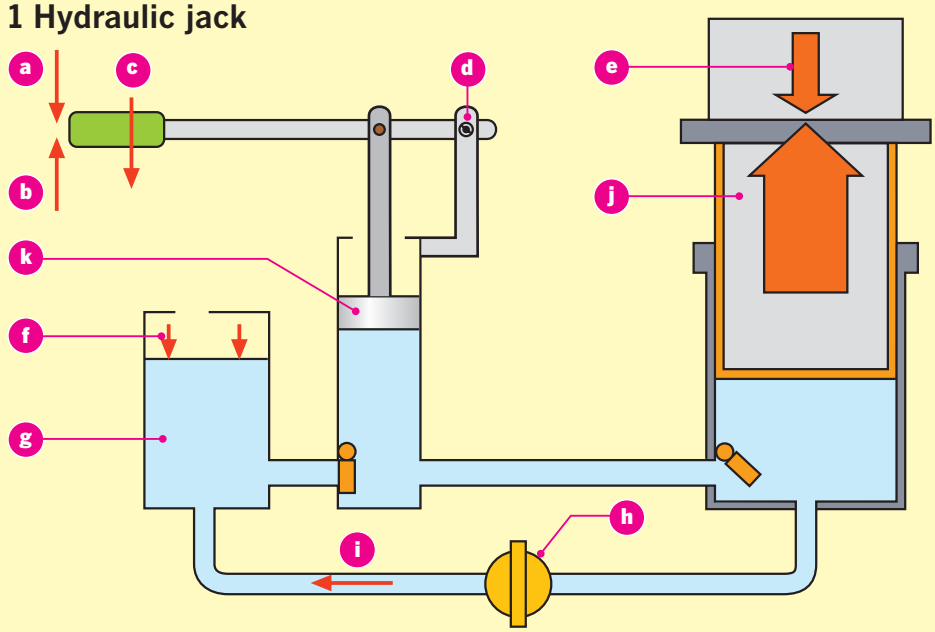
- The pressure exerted by the pump piston equals that exerted on the jack piston. As the area of the jack piston is large, the force exerted on the jack piston is large. However, the pump piston moves down more than the jack piston moves up. The work done by the pump piston equals the work done on the jack piston.

2 Car's hydraulic braking system

- A car braking system consists of a master cylinder and a series of slave cylinders.
- When the brake pedal is depressed pressure is transferred from the master cylinder to each slave cylinder.
- In a disc brake, a pair of brake pads acts on a spinning disc attached to the wheel.
- In a drum brake a drum rotates about a pair of brake shoes, each fitted with a lining.

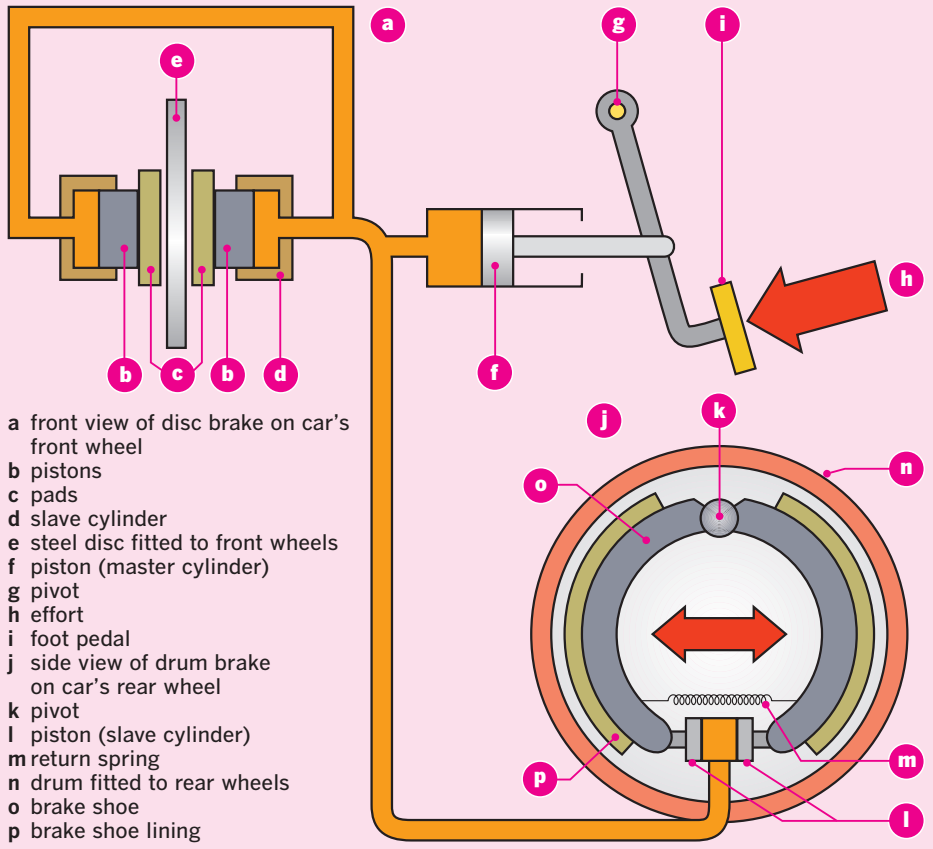
More complicated machines 2

1 Hydraulic jack



a down stroke
b up stroke
c effort
d pivot
e load
f atmospheric pressure
g fluid reservoir
h release valve
i fluid returns to reservoir
j jack piston
k pump piston

2 Car's hydraulic braking system



a front view of disc brake on car's front wheel
b pistons
c pads
d slave cylinder
e steel disc fitted to front wheels
f piston (master cylinder)
g pivot
h effort
i foot pedal
j side view of drum brake on car's rear wheel
k pivot
l piston (slave cylinder)
m return spring
n drum fitted to rear wheels
o brake shoe
p brake shoe lining