Hydraulics

Most liquids are relatively incompressible. This means that their volume decreases very little when pressure is applied to them. The pressure applied to a liquid is transmitted throughout the liquid. Hydraulic systems use this property of liquids to carry forces from one place to another.

The diagram shows a simple hydraulic brake. Pushing the brake pedal depresses piston one, which increases the oil pressure. The pressure is transmitted to piston two, which pushes the brake pad onto the wheel. The pressure throughout the oil is the same, so the size of the force, F_2, produced by F_1 will depend just on the relative areas of the pistons. In other words:

$$P = \frac{F_1}{A_1} = \frac{F_2}{A_2}$$

Therefore:

$$F_2 = \frac{F_1 \times A_2}{A_1}$$