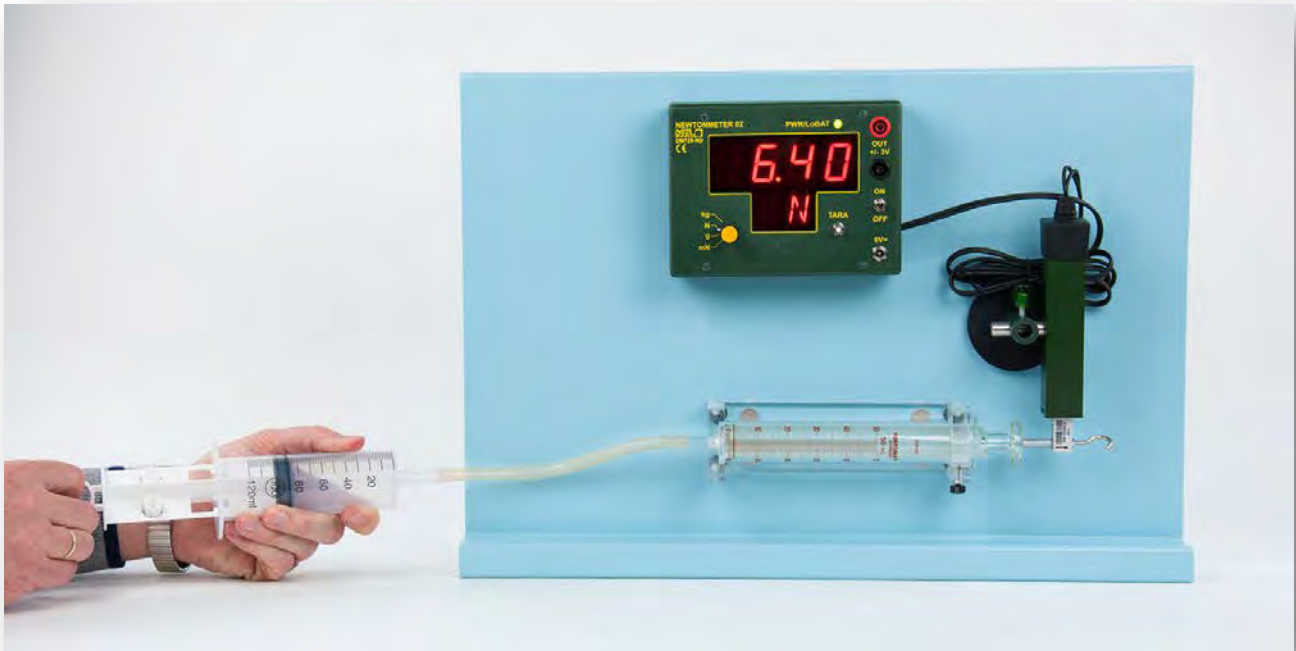


AREA DEPENDENCE OF THE COMPRESSION FORCE

MED 16.01b



Material:

Item-no.	Qty.	Description
DS615-1P	1	Metal plate for MBC system, 50 x 35 cm
C6100-1A	1	Syringe, 50 ml, glass
C6100-1B	1	Syringe, 100 ml, glass
C6100-5F	1	Holder for syringe 50ml, "inno"
C6100-5H	1	Holder for syringe 100ml, "inno"
C7445-5S	1	Hose, silicone, D=5/8 mm, L=100 cm
C7445-6S	1	Hose, silicone, D=6/9 mm, L=100 cm
DM725-ND	1	Newtonmeter "inno" 20 N / 2000 g
DS110-66	1	Magnetic base, d=66 mm, with tube and pin
C6100-2A	1	Syringe, 120ml, plastics

AREA DEPENDENCE OF THE COMPRESSION FORCE

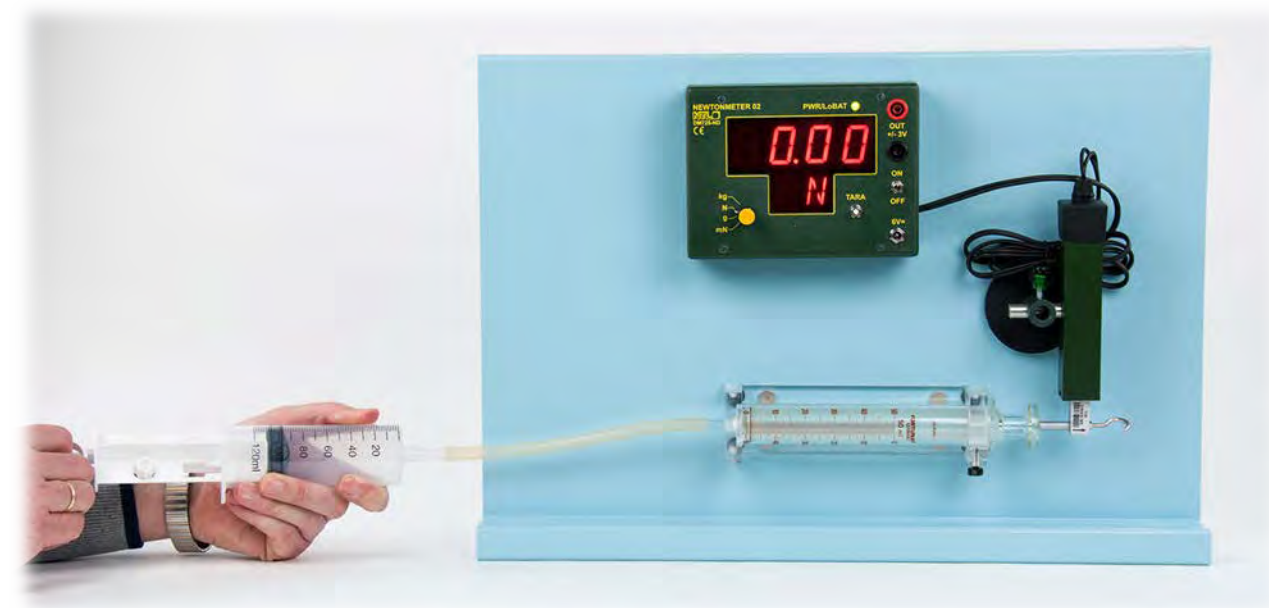
MED 16.01b

Purpose

Demonstration of the dependence of the pressure force on the effective area.

Preparation

- remove the plastic balls by removing the piston from the glass syringes and put the pistons back in afterwards
- the magnetic "inno" holder for the 50ml syringe is positioned on the magnetic panel
- place the 50 ml glass syringe in the "inno" holder
- fasten the syringe sensitively with the plastic screw
- pull out the piston of the plastic syringe until 70 ml
- connect the glass syringe and the plastic syringe with a small piece of hose (5/8 mm)
- the weighing bar of the Newtonmeter is placed with the help of the magnetic base besides the 50 ml glass syringe as shown on the image
- the opening of the weighing bar should touch the piston lightly in the centre, to achieve that the holder with the glass syringe is carefully moved
- we turn on the Newtonmeter and select the measuring range „N“, afterwards we tare (set to 0).



Experiment 1

Push in the piston of the plastic syringe by 5 ml and note the measured force in the chart
Repeat the same for the volumes 10, 15 and 20 ml - after each reading go back to the initial volume.

	Compressed volume in ml			
	5	10	15	20
Glass syringe 50 ml	 N	 N	 N	 N
Glass syringe 100 ml	 N	 N	 N	 N

AREA DEPENDENCE OF THE COMPRESSION FORCE

MED 16.01b

Experiment 2

Replace the 50 ml glass syringe with the 100 ml glass syringe and repeat Experiment 1. Again we note the measured values in the chart.

Conclusion

With the same compressed volume, the larger syringe causes greater pressure force.

Quantitative comparison

We remove the two pistons and determine the pressure area (A) of the two syringes. The diameters can best be measured with the calliper. The area is then calculated.

A (Glass syringe 50 ml): D = cm A = cm²

A (Glass syringe 100 ml): D = cm A = cm²

Compare the ratio of the pressure areas with the pressure force of the two glass syringes.

Note

In combustion engines greater forces (subsequently torques) can be achieved by using larger piston areas (cylinders).

The area - and thus the force - is also multiplied by using several cylinders.