Answer on Question 62027, Physics, Mechanics, Relativity

Question:

The small piston of hydraulic lift has an area of $0.20\ m^2$. A car weighing $1.2 \cdot 10^4 N$ sits on a rack mounted on the large piston. The large piston has an area of $0.90\ m^2$. How large a force must be applied to the small piston to support the car?

Solution:

By the hydraulic press formula we have:

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

here, A_1 is the area of the small piston, A_2 is the area of the large piston, F_1 is the force applied to the small piston, F_2 is the force applied to the large piston.

From this formula we can find the force applied to the small piston:

$$F_1 = F_2 \frac{A_1}{A_2} = 1.2 \cdot 10^4\ N \cdot \frac{0.20\ m^2}{0.90\ m^2} = 2.7 \cdot 10^3 N.$$

Answer:

$F_1 = 2.7 \cdot 10^3 N.$