

22. (a) According to Pascal's principle $F/A = f/a \rightarrow F = (A/a)f$.

(b) We obtain

$$f = \frac{a}{A}F = \frac{(3.80 \text{ cm})^2}{(53.0 \text{ cm})^2}(20.0 \times 10^3 \text{ N}) = 103 \text{ N} .$$

The ratio of the squares of diameters is equivalent to the ratio of the areas. We also note that the area units cancel.