The basic elements of a hydraulic press are shown in Fig. P2.68. The plunger has an area of 1 in.², and a force, $F_1$, can be applied to the plunger through a lever mechanism having a mechanical advantage of 8 to 1. If the large piston has an area of 150 in.², what load, $F_2$, can be raised by a force of 30 lb applied to the lever? Neglect the hydrostatic pressure variation.

A force of 30 lb, applied to the lever, results in a plunger force, $F_1$, of $F_1 = (8)(30) = 240$ lb.

Since $F_1 = pA_1$ and $F_2 = pA_2$, where $p$ is the pressure and $A_1$ and $A_2$ are the areas of the plunger and piston, respectively. Since $p$ is constant throughout the chamber,

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

so that

$$F_2 = \frac{A_2}{A_1} F_1 = \left(\frac{150 \text{ in.}^2}{1 \text{ in.}^2}\right)(240 \text{ lb}) = 36,000 \text{ lb}$$