37.9 The maximum pressure achieved in the cylinder of a car engine is $800psi$. How much force will be exerted on a $3.7in$ piston?

A. $700lb_f$

B. $2,200lb_f$

C. $4,300lb_f$

D. $8,600lb_f$

A useful representation of pressure is the amount of force applied over an area. This can be expressed through the formula below and rearranged to solve for the force, F.

$$P = \frac{F}{A}$$

$$F = PA$$

Determine the area of the piston.

$$A = \frac{\pi}{4}D^2 = \frac{\pi}{4}(3.7in)^2 = 10.75in^2$$

Solve for the force.

$$F = PA = \left(800\frac{lb_f}{in^2}\right)(10.75in^2) = 8600lb_f$$

Answer D