**37.10 A spring with 10 coils has squared ends and a shear modulus of $10 \times 10^6 psi$. The diameter of the wire is $0.15in$ and the average coil diameter is $1in$. What is the spring constant?**

A. $52 \frac{lb_f}{in}$

B. $63 \frac{lb_f}{in}$

C. $79 \frac{lb_f}{in}$

D. $105 \frac{lb_f}{in}$

The Spring Constant for a Helical Compression Spring can be determined using the following formula, where $k$ is the spring constant, $d$ is the diameter of the wire, $G$ is the shear modulus, $D$ is the coil diameter, and $N$is the number of *active* coils.

$$k = \frac{d^4 G}{8 D^3 N}$$

Using the table Type of Spring Ends, note that for squared ends the total number of coils $N_t$ is the number of active coils plus two. Solve for the number of active coils.

$$N_t = N + 2$$

$$N = N_t - 2 = 10 - 2 = 8$$

Solve for the spring constant.

$$k = \frac{d^4 G}{8 D^3 N} = \frac{(0.15in)^4 \left(10 \times 10^6 \frac{lb_f}{in^2}\right)}{8 \left(1in\right)^3 (8)} = 79 \frac{lb_f}{in}$$

**Answer C**