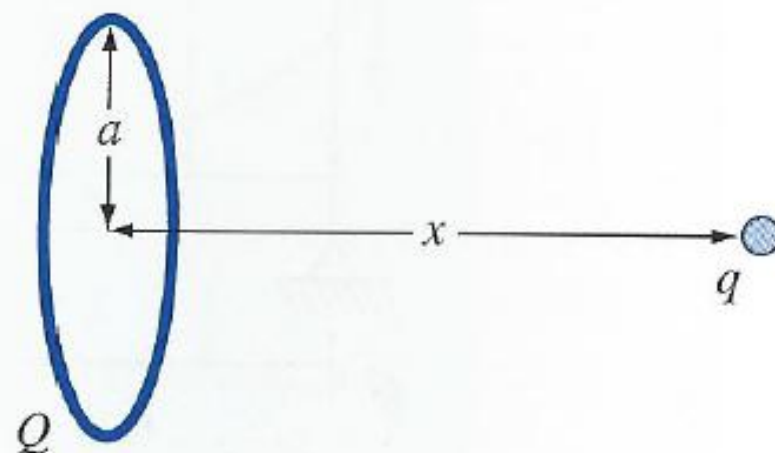**8.32** A total charge Q is uniformly distributed around a ring-shaped conductor with radius a. A charge q is located at a distance x from the center of the ring (Fig. P8.32). The force exerted on the charge by the ring is given by

$$F = \frac{1}{4\pi e_0} \frac{qQx}{(x^2 + a^2)^{3/2}}$$

where $e_0 = 8.85 \times 10^{-12} \, C^2/(N \, m^2)$. Find the distance x where the force is 1N if q and Q are 2×10^{-5} C for a ring with a radius of 0.9 m.

FIGURE P8.32

8.36 Mechanical engineers, as well as most other engineers, use thermodynamics extensively in their work. The following polynomial can be used to relate the zero-pressure specific heat of dry air, c_p kJ/(kg K), to temperature (K):

$$c_p = 0.99403 + 1.671 \times 10^{-4}T + 9.7215 \times 10^{-8}T^2$$
$$-9.5838 \times 10^{-11}T^3 + 1.9520 \times 10^{-14}T^4$$

Determine the temperature that corresponds to a specific heat of 1.2 kJ/(kg K).