Solutions to p 100

1. $$F = \frac{(9 \times 10^9 \; \frac{Nm^2}{C^2})(50 \times 10^{-6} \; C)(70 \times 10^{-6} \; C)}{(0.3\,m)^2} = 350 \; N$$

2. It will become 1/9 th as strong.

3. It will become 9 times stronger.

4. $$\frac{F_{new}}{F_{original}} = \frac{k0.5q_1q_2 \big/ (2r)^2}{kq_1q_2 \big/ r^2} = \frac{0.5}{4} = 0.125$$

   It will only be 0.125 or 1/8 times as strong.

5. $$\frac{F_{new}}{F_{original}} = \frac{1}{1} = \frac{k16q_1q_2 \big/ (xr)^2}{kq_1q_2 \big/ r^2} = \frac{\frac{16}{x^2}}{1}$$

   $$1/1 = 16/x^2$$

   $x^2 = 16$
   $x = 4$, so we have to separate the charges so that we now have 4 times the original distance.

6. $x = r$ = separation distance between the charges
   y = force of attraction or repulsion between the charges