Coulomb's Law $r = 1$

1. $F = 0.080\,N \times 2$ bec F depends directly on $q_1 \times q_2$

$F \propto q_1 q_2$ if $q_1 = 1C \times q_2 = 1C$

Ans. $0.160\,N$ then $F \propto 1 \cdot 1 = 1$

$2F$ so if $q_1 = 2C \times q_2 = 1C$

then $F \propto 2 \cdot 1 = 2$

it doubles

2. $F = 0.080\,N$ $F \propto q_1 q_2$ $F \propto 1 \times 1 = 1$

Ans - $0.32\,N$ $F \propto 2 \times 2 = 4 = Ans$

3. $F = 0.080\,N$ $F \propto \frac{1}{r^2}$ if $r = 1$

then $F \propto \frac{1}{1^2} = 1$

$0.25 \times 0.080\,N = 0.02\,N$ ANS if $r = 2$

then $F \propto \frac{1}{2^2} = \frac{1}{4} \times$

4. $F \propto \frac{1}{3^2} = \frac{1}{9} \times 0.080\,N = 0.0089\,N$ Ans

5. $F \propto \frac{1}{4^2} = \frac{1}{16} \times 0.080\,N = 0.0050\,N$ Ans

6. $F \propto \frac{1}{\left(\frac{1}{2}\right)^2} \propto \frac{1}{\frac{1}{4}} = 1 \times \frac{4}{1} = 4 \times 0.080\,N = 0.32\,N$ Ans

7. $F \propto \frac{(1)(2)}{(2)^2} = \frac{2}{4} = \frac{1}{2} \times 0.080\,N = 0.040\,N = F$

8. $F \propto \frac{(2)(2)}{(2)^2} = \frac{4}{4} = 1$ same F!

9. $F \propto \frac{(1)(4)}{(2)^2} = \frac{4}{4} = 1$ same F!

10. $F \propto \frac{(1)(3)}{(3)^2} = \frac{3}{9} = \frac{1}{3} \times 0.080\,N = 0.027\,N$

11. $F = k\frac{q_1 q_2}{r^2} = \frac{9\times10^9 \frac{Nm^2}{C^2} \cdot (4.0\times10^{-5}C)^2}{(0.10m)^2}$

$F = 1440\,N$

12. $F = k\frac{q_1 q_2}{r^2} = \frac{9\times10^9 \frac{Nm^2}{C^2} \cdot (-2.6\times10^{-6}C)(+3.8\times10^{-6}C)}{(0.75m)^2}$

$F = -0.158\,N$

13. $F = -0.492\,N$ att ∴ 1 is POS & 1 is NEG!

$\frac{r^2 \cdot F}{k} = \frac{k q_1 q_2 \cdot r^2}{k r^2}$ equally charged $q_1 = q_2$

$\therefore q_1 q_2 = q^2$

$\frac{Fr^2}{k} = \frac{q_1 q_2}{-1}$ $\sqrt{\frac{Fr^2}{k}} = \sqrt{q^2}$ $\sqrt{\frac{Fr^2}{k}} = q$

$\frac{-1}{29.1cm^2 \times \frac{1m}{100cm}} = 0.291\,m$ $q = \sqrt{\frac{+0.492N \cdot (0.291m)^2}{9\times10^9 \frac{Nm^2}{C^2}}}$

Ans: $q = 2.15\times10^{-6}C$

14. $r^2 \cdot \frac{F}{F} = k\frac{q_1 q_2}{r^2} \cdot \frac{r^2}{F}$

$\sqrt{r^2} = \sqrt{\frac{k q_1 q_2}{F}}$

$r = \sqrt{\frac{k q_1 q_2}{F}} = \sqrt{\frac{9\times10^9 \frac{Nm^2}{C^2}(5.0\times10^{-6}C)(+6.0\times10^{-6}C)}{+0.72N}}$

$r = 0.61\ m$

15. $F = k\frac{q_1 q_2}{r^2} = \frac{\left(9\times10^9 \frac{Nm^2}{C^2}\right)(-1.0\times10^{-6}C)(4.0\times10^{-6}C)}{(0.50m)^2}$

$F = -0.144\ N$

NEG = ATT

don't worry about this this year

F_{att}

F_g

FBD free body diagram

$F_{eff} = F_{net}$ = diff btw the 2 F