ANSWERS

CHAPTER 1

1.1 6×10^{-3} N (repulsive)

1.2   (a)   12 cm
           (b)   0.2 N (attractive)

1.3 2.4×10^{39}. This is the ratio of electric force to the gravitational force (at the same distance) between an electron and a proton.

1.5   Charge is not created or destroyed. It is merely transferred from one body to another.

1.6   Zero N

1.8   (a) 5.4×10^{6} N C^{-1} along OB
           (b) 8.1×10^{-3} N along OA

1.9   Total charge is zero. Dipole moment $= 7.5 \times 10^{-8}$ C m along z-axis.

1.10 10^{-4} N m

1.11   (a) 2×10^{12}, from wool to polythene.
            (b)   Yes, but of a negligible amount ($= 2 \times 10^{-18}$ kg in the example).

1.12   (a) 1.5×10^{-2} N
            (b)   0.24 N

1.13   Charges 1 and 2 are negative, charge 3 is positive. Particle 3 has the highest charge to mass ratio.

1.14   (a) 30Nm^2/C,   (b) 15 Nm^2/C

1.15   Zero. The number of lines entering the cube is the same as the number of lines leaving the cube.

1.16   (a)   0.07 μC
            (b)   No, only that the net charge inside is zero.

1.17 2.2×10^{5} N m^2/C

1.18 1.9×10^{5} N m^2/C

1.19   (a) -10^{3} N m^2/C; because the charge enclosed is the same in the two cases.
            (b) -8.8 nC

1.20 -6.67 nC

1.21   (a) 1.45×10^{-3} C
            (b) 1.6×10^{8} Nm^2/C

1.22   10 μC/m

1.23   (a) Zero, (b) Zero, (c) 1.9 N/C