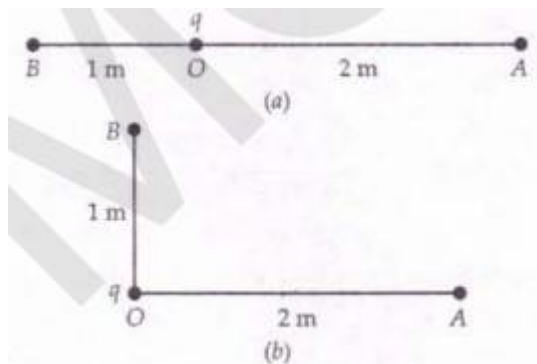


Problems For Practice

1. The work done in moving a charge of 3 C between two points is 6 J. What is the potential difference between the two points? (Ans. 2 V)
2. The electric potential at 0.9 m from a point charge is +50 V. What is the magnitude and sign of the charge? [CBSE D 95C] (Ans. $5 \times 10^{-9} \text{C}$, positive)
3. The electric field at a point due to a point charge is 20 NC^{-1} and the electric potential at that point is 10 JC^{-1} , Calculate the distance of the point from the charge and the magnitude of the charge. [CBSE D 06] (Ans. 0.5 m, $0.55 \times 10^{-9} \text{C}$)
4. Two points A and B are located in diametrically opposite directions of a point charge of $+ 2 \mu\text{C}$ at distances 2.0 m and 1.0 m respectively from it. Determine the potential difference $V_A - V_B$ - (Ans. $- 9 \times 10^3 \text{ V}$)
5. A hollow metal sphere is charged with $0.4 \mu\text{C}$ of charge and has a radius of 0.1 m. Find the potential (i) at the surface (ii) inside the sphere (iii) at a distance of 0.6 m from the centre. The sphere is placed in air. (Ans. 36 kV, 36 kV, 6 kV)
6. Two point charges of $+10 \mu\text{C}$ and $+ 20 \mu\text{C}$ are placed in free space 2 cm apart. Find the electric potential at the middle point of the line joining the two charges. (Ans. 27 MV)
7. Two point charges q and $-2q$ are kept 'd' distance apart. Find the location of the point relative to charge 'q' at which potential due to this system of charges is zero.
[CBSE OD 14C] (Ans. At distance $d / 3$ from charge q)
8. Two point charges, one of $+ 100 \mu\text{C}$ and another of $400 \mu\text{C}$, are kept 30 cm apart. Find the points of zero potential on the line joining the two charges (assume the potential at infinity to be zero). (Ans. 6 cm from $+ 100 \mu\text{C}$ charge)

9. A charge $q = + 1 \mu\text{C}$ is held at O between the points A and B such that $AO=2 \text{ m}$ and $BO = 1 \text{ m}$, as shown in Fig. 2.15(a). Calculate the potential difference (V_A-V_B). What will be the value of the potential difference (V_A-V_B) if position of B is changed as

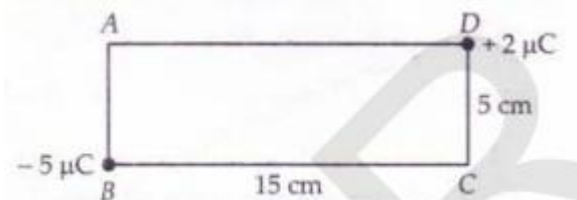
Shown in Fig. 2.15(b)? (Ans. - 4500 V, 4500 V)



10. Two small spheres of radius 'a' each carrying charges $+ q$ and are placed at points A and B, distance 'd' apart. Calculate the potential difference between points A and B.

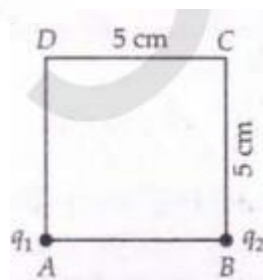
(Ans. $2q/44\pi\epsilon_0 d$.)

11. The sides of rectangle ABCD are 15 cm and 5 cm, as shown in Fig. 2.16. Point charges of $5 \mu\text{C}$ and $+ 2\mu\text{C}$ are placed at the vertices B and D respectively. Calculate electric potentials at the vertices A and C. Also calculate the work done in carrying a charge of $3 \mu\text{C}$ from A to C. (Ans. 2.52 J)



12. Charges of $2.0 \times 10^6 \text{ C}$ and $1.0 \times 10^6 \text{ C}$ are placed at the corners A and B of a square of side 5.0 cm as shown in Fig.

2.17. How much work will be done in moving a charge of $1.0 \times 10^6 \text{ C}$ from C to D against the electric field? (Ans. 0.053 J)



13. Calculate the potential at the centre of a square ABCD of each side $\sqrt{2}$ m due to charges 2, -2, -3 and 6 μC at four corners of it. [Haryana 97] (Ans. 2.7×10^{-4} V)

14. Charges of 1.0×10^{-11} , -2.0×10^{-11} C, -2×10^{-11} C, $+1.0 \times 10^{-11}$ C are placed respectively at the corners B, C and D of a rectangle ABCD. Determine the potential at the corner A. Given AB = 4 cm and BC = 3cm (Ans. 1.65 V)

15. ABCD is a square of side 0.2 m. Charges of 2×10^{-9} , 4×10^{-9} , 8×10^{-9} C are placed at the corners A, B and C respectively. Calculate the work required to transfer a charge of 2×10^{-9} C from D to the centre O of the square. [Karnataka 88] (Ans 6.27×10^{-9} J)

16. Positive charges of 6, 12 and 24 nC are placed at the three vertices of a square. What charge must be placed at the fourth vertex so that total potential at the centre of the square is zero? (Ans. - 42 nC)

17. Two equal charges, 2.0×10^{-7} C each are held fixed at a separation of 20 cm. A third charge of equal magnitude is placed midway between the two charges. It is now moved to a point 20 cm from both the charges. How much work is done by the electric field during the process? (Ans: -3.6×10^{-3})

18. ABC is a right-angled triangle, where AB and BC are 25 cm and 60 cm respectively; a metal sphere of 2 cm radius charged to a potential of 9×10^5 V is placed at B. Find the amount of work done in carrying a positive charge of 1 C from C to A. (Ans. 0.042 J)

