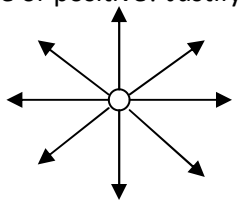
Swami Vivekanand Vidyashram Sr. Sec. School Alld.

Class – XII **Physics Worksheet**

1. Two fixed point charges +4e and +e units are separated by a distance a. Where should a third point charge q be placed on the line joining the two charges so that it is equilibrium. In which condition the equilibrium will be stable and in which unstable? **[CBSE2005]**
2. Two identical point charges +Q and +Q are kept at distance r apart. A third point charge q is placed on the line joining the above the two charges such that all charges are in equilibrium. What is the magnitude, sign and position of third charge? **[CBSE2005]**
3. The force of attraction between two point charges at a distance r apart is F. What should be distance apart in the same medium so that the force becomes F/3? What if the force becomes 3F? **[CBSE2000]**
4. How does the force between two point charges change, if dielectric constant of medium in which they are kept, increases? **[CBSE2005]**
5. Why do electrostatic field lines not form closed loops? **[CBSE2015]**
6. Why do the electric field lines never cross to each other? **[CBSE2015]**
7. Define the electric dipole moment and write its SI units? **[CBSE2008]**
8. A point charge +Q is kept in the vicinity of an uncharged conducting plate .Sketch electric field lines between the charge and the plate. **[CBSE2009]**
9. Derive an expression for intensity of electric field E due to dipole length 2l at a point distance r from the centre of dipole on axial line .Also draw the graph E versus r for **r>>>l [CBSE2006, 17]**
10. If a dipole were kept in a uniform external field E_0, diagrammatically represent the position of of dipole in stable and unstable equilibrium and write the expressions for the torque acting on dipole in both cases. **[CBSE2017]**
11. Define the term electric dipole moment. Is it vector or scalar quantity? Obtain an expression for electric field at a point on equatorial plane of an electric dipole of length 2l. **[CBSE2009]**
12. Deduce an expression for torque acting on dipole of dipole moment $\vec{p}$ in the presence of uniform electric field$\vec{E}$. **[CBSE2014]**
13. Figure shows the field lines of positive charge. Is the work done by the electric field in moving small positive charge from Q to p negative or positive? Justify your answer. **[CBSE2014]**



14. Using Gauss's law deduce the expression for electric field due to a uniformly charged spherical conducting shell of radius R at a point (i) outside and (ii) inside of the shell. Plot graph showing variation of electric field as function of r>R and r< R.**[CBSE2013]**
15. An infinitely large thin plane sheet has a uniform surface charge density +σ. Obtain an expression for the amount of work done in bringing a point charge q from infinity to a point distant r in front of charged plane sheet. **[CBSE2017]**
16. Consider a uniform electric field E =3x10^3 N/C. Calculate (a) What is the flux of this field through a square of side 10cm whose plane parallel to the y-z plane.(b) What is the flux through the same square if the normal of its plane makes an angle of 60^0 with x –axis. **[CBSE2015]**

17. A charge q is placed at the centre of cube. What is electric flux through the cube? **[CBSE2012]**

18. Two charges of magnitudes -2Q and +Q are located at point (a, 0) and (4a, 0) respectively. What is the electric flux due to these charges with its centre at its origin? **[CBSE2013]**

19. Using Gauss's law obtain the expression for the electric field due to a uniformly charged thin spherical shell of radius r at a point outside of the shell. Draw a graph showing the variation of electric field with r, for r>R and r<R.

[CBSE2011]

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20. A charge q is placed at the centre of cube of side l. What is the electric flux passing through two opposite faces of cube? **[CBSE2012]**

21. A cylinder is immersed in a uniform electric field E with its axis parallel to field. Show that the electric field through the cylinder is zero. **[CBSE2010]**

22. Two charges of magnitudes +4Q and –Q are located at points (a, o) and (-3a, 0) respectively. What is electric flux due to these charges through the sphere of radius 2a with its centre at origin? **[CBSE2013]**

23. Define electric flux .Write its SI unit. A charge q is enclosed by a spherical surface of radius R. If radius is reduced to half, how would the electric flux through the surface change. **[CBSE2015, 06, 08, 09]**

24. Two infinitely large plane thin parallel sheets having surface charge densities σ_1 and σ_2 ($\sigma_1 > \sigma_2$) are shown in figure Write the magnitude and directions of field in the region II and III. **[CBSE2015]**

25. A thin conducting spherical shell of radius R has charge Q spread uniformly over its surface .Using Gauss's law, derive an expression for an electric field at a point outside of the shell. Draw graph of electric field E(r) with distance r from centre of shell for **$0 < r < \infty$** . **[CBSE2009]**

26. Figure shows three point charge +2q, -q and +3q. Two charges +2q and –q are enclosed within the surface S.hat is electric flux due to this configuration through the surface S. **[CBSE2010]**

27. A spherical conducting shell of inner radius r_1 and outer radius r_2 has a charge Q.A charge q is placed at the centre of the shell.

(a) What is surface charge density on the inner surface and outer surface?

(b) Write an expression for the electric field at a point $s > r_2$ from the centre of the shell. **[CBSE2010]**

28. Show that the electric field at the surface of charged conductor is given by $E = \sigma/\varepsilon_0$ n. Where σ is surface charge density and n is unit vector along outward drawn normal on the surface. **[CBSE2010]**

29. A small metal sphere carrying charge +Q is located at centre of a a spherical cavity in a large uncharged metal sphere as shown in figure. Use Gauss's theorem to find electric field at point P_1nad P_2. **[CBSE2010]**

30. Guass's law in electrostatic is true for any closed surface, no matter what its shape or size is. Justify this statement with the help of suitable example. **[CBSE2015]**

31. Use Gauss's law to derive the expression for the electric field between two uniformly charged large parallel sheets with surface charge densities +σ and -σ respectively. **[CBSE2009]**

32. Consider two hollow concentric spheres S_1 and S_2 enclosing charges 2Q and 4Q respectively.(i) Find out ratio of electric flux through them.(ii)How will the electric flux through the sphere S_1 change if a medium of dielectric constant ε_r introduced in the space inside in place if air? **[CBSE2014]**

33. Use Guass's law to find the electric field intensity at any point due to an infinite plane thin sheet having uniform charge density σ. What is direction of field for positive and negative charge densities? **[CBSE2016, 17]**