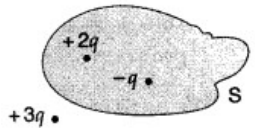
PM SHRI K.V. BNP DEWAS SUMMER VACATION 2025 H.W.

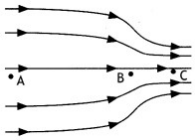
(A) Take the printouts of the following worksheets and solve in your Physics H.W. Copy.

Chapter 1. Electric charges and fields

1. **Which orientation of an electric dipole in a uniform electric field would correspond to stable equilibrium?**
2. **If the radius of the Gaussian surface enclosing a charge is halved, how does the electric flux through the Gaussian surface change ?**
3. **Define the term electric dipole moment of a dipole. State its S.I. unit**
4. **Figure shows three point charges, +2q, -q and + 3q. Two charges +2q and -q are enclosed within a surface 'S'. What is the electric flux due to this configuration through the surface 'S' (Delhi 2010)**



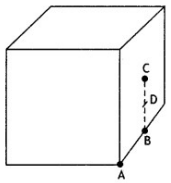
5. **Why should electrostatic field be zero inside a conductor? (Delhi 2012)**
6. **A charge 'q' is placed at the centre of a cube of side l. What is the electric flux passing through each face of the cube? (All India 2012)**
7. **Two charges of magnitudes -3Q and + 2Q are located at points (a, 0) and (4a, 0) respectively. What is the electric flux due to these charges through a sphere of radius '5a' with its centre at the origin?**
8. **Draw a plot showing variation of electric field with distance from the centre of a solid conducting sphere of radius R, having a charge of +Q on its surface.**
9. **Derive an expression for the torque experienced by an electric dipole kept in a uniform electric field. (Delhi 2017)**
10. **Show that the electric field at the surface of a charged conductor is given by $E\rightarrow=(\sigma/\varepsilon_0)\,n\hat{}$, where σ is the surface charge density and h is a unit vector normal to the surface in the outward direction. (All India 2010)**
11. **A thin straight infinitely long conducting wire having charge density X is enclosed by a cylindrical surface of radius r and length l, its axis coinciding with the length of the wire. Find the expression for the electric flux through the surface of the cylinder. (All India 2011)**
12. **Plot a graph showing the variation of coulomb force (F) versus $(1/R^2)$, where r is the distance between the two charges of each pair of charges : (1μC, 2μC) and (2μC, – 3μC). Interpret the graphs obtained. (All India 2010)**
13. **A hollow cylindrical box of length 1m and area of cross-section 25 cm^2 is placed in a three dimensional coordinate system as shown in the figure. The electric field in the region is given by $E\rightarrow=50xi\hat{}$ where E is in NC^{-1} and x is in metres. Find : (a)Net flux through the cylinder (b)Charge enclosed by the cylinder. (Delhi 2013)**
14. **Two charged spherical conductors of radii R_1 and R_2 when connected by a conducting wire acquire charges q_1 and q_2 respectively. Find the ratio of their surface charge densities in terms of their radii. (Delhi 2014)**
15. **A charge is distributed uniformly over a ring of radius 'a'. Obtain an expression for the electric intensity E at a point on the axis of the ring. Hence show that for points at large distances from the ring, it behaves like a point charge. (Delhi 2016)**
16. **Draw the pattern of electric field lines, when a point charge –Q is kept near an uncharged conducting plate. (CBSE Delhi 2019)**
17. **In the figure given below, at which point electric field is maximum?**



18. What will be the total flux through the faces of the cube (figure) with the side of length 'a' if a charge q is placed at

(a) A: a corner of the cube. (b) B: mid-point of an edge of the cube.

(c) C: center of the face of the cube.(d) D: mid-point of B and C. {NCERT Exemplar)



19. State Gauss's law in electrostatics. Derive an expression for the electric field due to an infinitely long straight uniformly charged wire

20. (a) Define electric flux. Write its S.I. units.

(b) Using Gauss's law, prove that the electric field at a point due to a uniformly charged infinite plane sheet is independent of the distance from it.

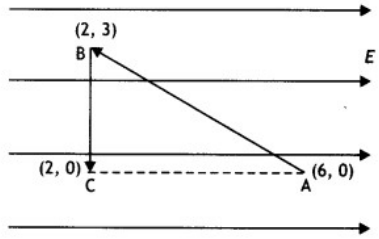
(c) How is the field directed if

(i) the sheet is positively charged,

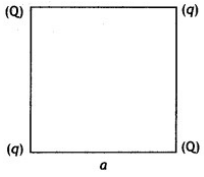
(ii) negatively charged? (Delhi 2012)

Chapter 2. Electric potential and capacitnce

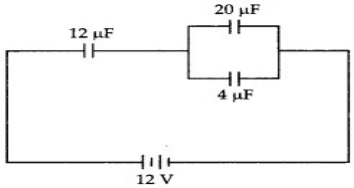
1. **Draw the equipotential surfaces due to an isolated point charge. (CBSE Delhi 2019)**
2. **'For any charge configuration, equipotential surface through a point is normal to the electric field'. Justify. (CBSE Delhi 2014)**
3. **Why is the electrostatic potential inside a charged conducting shell constant throughout the volume of the conductor? (CBSE AI 2019)**
4. **Does the charge given to a metallic sphere depend on whether it is hollow or solid? (CBSE Delhi 2017)**
5. **Draw a plot showing the variation of (i) electric field (E) and (ii) electric potential (V) with distance r due to a point charge Q. (CBSE Delhi 2012)**
6. **Two identical capacitors of 10 pF each are connected in turn (i) in series and (ii) in parallel across a 20 V battery. Calculate the potential difference across each capacitor in the first case and the charge acquired by each capacitor in the second case. (CBSE AI 2019)**
7. **A test charge 'q' is moved without acceleration from A to C along the path from A to B and then from B to C in electric field E as shown in the figure, (i) Calculate the potential difference between A and C, (ii) At which point (of the two) is the electric potential more and why? (CBSE AI 2012)**



8. **Four-point charges Q, q, Q., and q are placed at the corners of a square of side 'a' as shown in the figure. Find the potential energy of this system. (CBSEAI, Delhi 2018)**

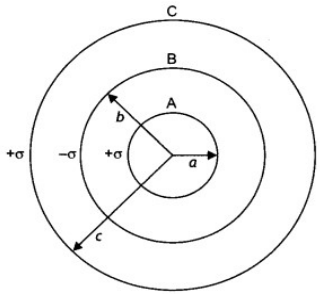


9. **(a) Obtain the expressions for the resultant capacitance when the three capacitors C_1, C_2, and C_3 are connected (i) in parallel and then (ii) in series.**
   (b) In the circuit shown in the figure, the charge on the capacitor of 4 µF is 16 µC. Calculate the energy stored in the capacitor of 12 µF capacitance. (CBSE 2019C)

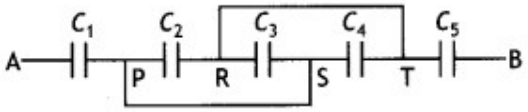


10. **(i) Draw the equipotential surfaces corresponding to a uniform electric field in the z-direction. (ii) Derive an expression for the electric potential at any point along the axial line of an electric dipole. (CBSE Delhi 2019)**
11. **A charge Q is distributed over the surfaces of two concentric hollow spheres of radii r and R (R >> r), such that their surface charge densities are equal. Derive the expression for the potential at the common center.**
12. **Three concentric metallic shells A, B, and C of radii a, b, and c (a <b < C) have surface charge densities +a, -a, and + o respectively as shown. Obtain the expressions for the potential of three**

shells A, B, and C. If shells A and C are at the same potential, obtain the relation between a, b and c. (CBSE 2019)



13. **Electric field intensity at point B due to a point charge Q kept at point A is 24 N C^{-1} and the electric potential at point B due – to the same charge is 12 J C^{-1}. Calculate the distance AB and also the magnitude of the charge Q**
14. **Two identical capacitors of 12 pF each are connected in series across a 50 V battery. Calculate the electrostatic energy stored in the combination. If these were connected in parallel across the same battery, find out the value of the energy stored in this combination. (CBSE Al 2019)**
15. **(a) Find equivalent capacitance between A and B in the combination given below. Each capacitor is**



of 2 μF capacitance.

(b) If a DC source of 7 V is connected across AB, how much charge is drawn from the source and what is the energy stored in the network? (CBSE Delhi 2017)

15. Derive an expression for the potential energy of an electric dipole of dipole moment $\vec{p}$ in the electric field $\vec{E}$ (Delhi 2008)

(B) Select one Investigatory Project and work on it. Make a file of the Investigatory Project and submit it as soon as the school reopens after the summer vacation.

ग्रीष्मकालीन अवकाश हेतु गृह कार्य

कक्षा 12 हिंदी

सत्र 2025-26

1) अपनी पाठ्य पुस्तक "आरोह" के सभी पाठों का संक्षिप्त विवरण दर्शाते हुए एक माइंड मैप बनाएं। व्यक्तिगत रूप से बनाने वाले विद्यार्थी फाइल में बनाएं, सामूहिक रूप से बनाने वाले विद्यार्थी चार्ट पेपर पर बनाएं।

2) प्रतिदिन एक पन्ना सुलेख के रूप में डायरी लेखन (कुल पचास पृष्ठ) करें।

3) केंद्रीय विद्यालय की प्रार्थना, हिंदी प्रतिज्ञा एवं राष्ट्रगान कॉपी में लिखें, कंठस्थ करें एवं उनका अर्थ भी लिखें।

टिप्पणी :-अवकाश कालीन गृह कार्य सभी विद्यार्थियों के लिए अनिवार्य है। सही तरीके से कार्य पूर्ण करने पर आंतरिक मूल्यांकन में अंक जोड़े जाएंगे एवं न करने पर घटाए जाएंगे।

द्वारा

कविता जड़िया

पीजीटी हिंदी

पी एम श्री केंद्रीय विद्यालय देवास

CLASS XII A

PHYSICS

-DO ALL THE WORKSHEET SHARED IN GROUP

PM SHRI KENDRIYA VIDYALAYA DEWAS

Work Sheet 1

Chapter 1. Relations And Functions		
S.No	**QUESTIONS (MCQ)**	
1.	If R is a relation on the set of all straight lines drawn in a plane defined by l_1 R l_2 iff $l_1 \perp l_2$ then R is (a) reflexive (b) symmetric (c) transitive (d) an equivalence relation	
2.	If R is relations on **R** (set of real number) defined by aRb iff $a \geq b$, then R is (a) an equivalence relation (b) reflexive, transitive but not symmetric (c) symmetric, transitive but not reflexive (d) neither reflexive nor transitive but symmetric	
3.	If R is a relation on the set of real number **R** defined by x R y iff $x - y + \sqrt{2}$ is an irrational number then R is (a) reflexive (b) symmetric (c) transitive (d) an equivalence relation	
4.	If R is a relation on the set A = {1,2,3} defined by {(1,2)},then R is (a) reflexive (b) symmetric (c) transitive (d) none of the above	
5.	If R is a relation on the set A ={1,2,3}given by R={(1,1),(2,2),(3,3),(1,2),(2,3),(1,3)},then R is (a) reflexive but not symmetric (b) reflexive but not transitive (c) symmetric and transitive (d) neither symmetric nor transitive	
6.	If R is a relation on the set A ={1,2,3}given by R={(1,1),(2,2),(1,3)},then R is (a) reflexive (b) symmetric (c) transitive (d) an equivalence relation	
7.	If R is a relation on the set A ={1,2,3}given by R={(1,1),(2,2),(3,3)},then R is (a) reflexive (b) symmetric (c) transitive (d) an equivalence relation	
8.	If A = {1,2,3}, then which of the following relations are equivalence relation on A (a) {(1,1),(2,2),(3,3)} (b) {(1,1),(2,2),(3,3),(1,2),(2,1)} (c) {(1,1),(2,2),(3,3)(2,3),(3,2)} (d) all of above	
9.	If A = {1,3,5}, then number of equivalence relation on A containing (1,3) is (a) 1 (b) 2 (c) 4 (c) 5	
10.	If A = {1,2,3}, then maximum number of equivalence relation on A is (a) 2 (b) 3 (c) 4 (c) 5	
11.	Let A = {1, 2, 3}. Then number of relations containing (1, 2) and (1, 3) which are reflexive and symmetric but not transitive is (a) 1 (b) 2 (c) 3 (d) 4	
12.	Let A = {1, 2, 3}. Then number of equivalence relations containing (1, 2) is (a) 1 (b) 2 (c) 3 (d) 4	
13.	If R is a relation on the set A ={1,2,3}given by R={(1,2),(2,1),(3,3)},then R is (a) symmetric and transitive but not reflexive (b) reflexive and symmetric but not transitive (c) symmetric, but neither reflexive nor transitive (d) an equivalence relation	
14.	Let R be the relation in the set **N,** given by R = $\{(x,y): x = y + 3, y > 5\}$. Choose the correct answer from the following (a) (7,4) ∈ R (b) (9,6) ∈ R (c) (4,7) ∈ R (d) (8,5) ∈ R	
15.	Let R be the relation in the set **N,** given by R = $\{(x,y): x = y - 2, y > 6\}$. Choose the correct answer from the following (a) (8,7) ∈ R (b) (6,8) ∈ R (c) (3,8) ∈ R (d) (2,4) ∈ R	
16.	Let A = {3,5}. Then number of reflexive relation on set A is (a) 2 (b) 4 (c) 0 (d) 8	
17.	If A = {1,2,3} and B = {a,b}, then the number of function from A to B is (a) 3 (b) 6 (c) 8 (d) 12	
18.	If function f:N→N is defined by $f(x) = 2x + 3$ for all $x \in$ N then f is (a) surjective (b) injective (c) bijective (d) none of these	
19.	If A = {1,2,3,….n}, n ≥ 2 and B = {a,b} then the number of surjections from A to B is (a) $^nP_2$ (b) $2^n - 2$ (c) $2^n - 1$ (d) none of these	
20.	If A = {a,b,c} and B = { -3,-2,0,1,3}, then the number of injections that can be defined from A to B is (a) 125 (b) 243 (c) 60 (d) 120	
21.	If A and B are two sets such that O(A) = 5 and O(B) = 6, then the number of one-one and onto mapping from A to B is (a) 120 (b) 720 (c) 0 (d) none of these	

22.	Which of the following functions from Z → Z is a bijection ? (a) $f(x) = x^3$ (b) $f(x) = x + 2$ (c) $f(x) = 2x + 1$ (d) $f(x) = x^2 + 1$	
23	Let $f : \mathbf{R} \to \mathbf{R}$ be defined as $f(x) = 3x$. Choose the correct answer. (a) f is one-one onto (b) f is many-one onto (c) f is one-one but not onto (d) f is neither one-one nor onto.	
24	Let $f : \mathbf{R} \to \mathbf{R}$ be defined as $f(x) = x^4$. Choose the correct answer. (a) f is one-one onto (b) f is many-one onto (c) f is one-one but not onto (d) f is neither one-one nor onto.	
25.	Let set X = {1,2,3} and relation R is defined in X as R = {(1,3),(2,2),(3,2)} then minimum ordered pairs which should be added in relation R to make it reflexive and symmetric are (a) {(1,1),(2,3),(1,2)} (b) {(3,3),(3,1)(1,2)} (c) {(1,1),(3,3),(3,1),(2,3)} (d) {(1,1),(3,3),(3,1),(1,2)}	
26.	Let X = $\{x^2 : x \in N\}$ and function $f : N \to X$ is defined by $f(x) = x^2$, $x \in N$ then this function is (a) injective only (b) not bijective (c) surjective only (d) bijective	
27.	A function $f : \mathbf{R} \to \mathbf{R}$ defined by $f(x) = 2 + x^2$ *is* (a) not one-one (b) one-one (c) not onto (d) neither one-one nor onto	
	LONG ANSWER (5 Marks)	
1.	Check whether the relation S in the set of all real numbers ($\mathbb{R}$) defined by $S = \{(a, b) : a \le b^3\}$ is reflexive, symmetric or transitive.	
2.	A relation R on set A = {1, 2, 3, 4, 5} is defined as $R = \{(x, y) : |x^2 - y^2| < 8\}$. Check whether the relation R is reflexive, symmetric and transitive.	
3.	A relation R is defined on N ´ N (where N is the set of natural numbers) as : $(a, b) R (c, d) \Leftrightarrow a - c = b - d$ Show that R is an equivalence relation.	
4.	A relation R on set A = {– 4, – 3, – 2, – 1, 0, 1, 2, 3, 4} be defined as R = {(x, y) : x + y is an integer divisible by 2}. Show that R is an equivalence relation. Also, write the equivalence class [2].	
5.	Check whether the relation S in the set of real numbers R defined by S ={(a,b): where $a - b + \sqrt{2}$ is an irrational number}is reflexive, symmetric or transitive.	
6.	A relation R is defined on N ´ N (where N is the set of natural numbers) as (a, b) R (c, d) $\Leftrightarrow \frac{a}{c} = \frac{b}{d}$ Show that R is an equivalence relation.	
7.	Show that the relation S on the set $A = \{x \in Z : 0 \le x \le 12\}$ given by $S = \{(a,b) : a,b \in Z, |\boldsymbol{a - b}|$ is divisible by 4} is an equivalence relation.Find the set of all elements related to 1.	
8.	A function f is defined from R →R as f(x) = ax + b, such that f(1) = 1 and f(2) = 3. Find function f(x). Hence, check whether function f(x) is one-one and onto or not.	
9.	Let A = R –{5} and B = R –{1}. Consider the function f: A→B defined by $f(x) = \frac{x-3}{x-5}$. Show that f is one-one and onto.	
10.	Show that a function f : R →R defined as $f(x) = x^2 + x + 1$ is neither one-one nor onto. Also, find all the values of x for which f(x) = 3.	
11.	Show that a function f : R → R defined by $f(x) = \frac{2x}{1+x^2}$ is neither one-one nor onto. Further, find set A so that the given function f : R→A becomes an onto function.	
12.	Let A = R – {3} and B = R – {a}. Find the value of 'a' such that the function f : A → B defined by $f(x) = \frac{x-2}{x-3}$ is onto. Also, check whether the given function is one-one or not.	
	CASE STUDY QUESTIONS	
1.	 Students of school are taken to a railway museum to learn about railway heritage and its history n exhibit in the museum depicted many rail lines on the track near the railway station. Let L be the set of all rail lines on the railway track and and R be the relation on L defined by **R = {(l_1,l_2): l_1 *is parallel to* l_2 }** on the basis of this information answer the following questions (a) Find whether the relation R is symmetric or not (b) Find whether the relation R is transitive or not	

	(c) If one of the rail lines of railway track represent by the equation y = 3x + 2 then find the set of rail lines in R related to it OR (c) Let S be the relation defined by S = {(l_1,l_2): l_1 *is perpendicular to* l_2 } check whether the relation S is symmetric and transitive	
2.	Sherlin and Danju are playing Ludo at home during COVID-19. While rolling the dice,  Sharlin's sister Raji observed and noted the possible outcomes of throw every times belongs to set {1,2,3,4,5,6}. Let A be the set of players while B be the set of all possible outcomes. A = {S=Sharlin,D=Danju} B = {1,2,3,4,5,6} Based on the above information, answer the following questions. (a) Let R:B→B be defined by R = {(x,y): y is divisible by x}, then show that R is reflexive but not symmetric. (b) Raji wants to know the number of function from A to B. How many number of functions are possible (c) Let R be a relation on set B defined by R = {(1,2),(2,2),(1,3),(3,4),(3,1),(4,3),(5,5)} Then show that R is neither reflexive nor symmetric nor transitive. OR (c) Let R:B→B be defined by R = {(1,1),(1,2),(2,2), (3,3),(4,4),(5,5)(6,6)}then show that R is reflexive and transitive but not symmetric (d) How many relation are possible from A to B	
3	A general election of Lok Sabha is a gigantic exercise. About 911 million people were eligible to vote and voter turnout was about 67%, the highest ever  Let I be the set of all citizens of India who were eligible to exercise their voting right in general election held in 2019. A relation 'R' is defined on I as follows: R = {(V_1,V_2): V_1,V_2 ∈I and both use their voting right in general election – 2019} **1.** Two neighbors X and Y∈ I. X exercised his voting right while Y did not cast her vote in general election – 2019. Which of the following is true? a. (X,Y) ∈R b. (Y,X) ∈R c. (X,X) ∉R d. (X,Y) ∉R **2.** Mr.'*X*' and his wife '*W*'both exercised their voting right in general election -2019, Which of the following is true? a. both (X,W) and (W,X) ∈ R b. (X,W) ∈ R but (W,X) ∉ R c. both (X,W) and (W,X) ∉ R d. (W,X) ∈ R but (X,W) ∉ R **3.** Three friends F1, F2 and F3 exercised their voting right in general election-2019, then which of the following is true? a. (F1,F2) ∈R, (F2,F3) ∈ R and (F1,F3) ∈ R b. (F1,F2) ∈ R, (F2,F3) ∈ R and (F1,F3) ∉ R c. (F1,F2) ∈ R, (F2,F2) ∈R but (F3,F3) ∉ R d. (F1,F2) ∉ R, (F2,F3) ∉ R and (F1,F3) ∉ R **4.** The above defined relation R is _____ a. Symmetric and transitive but not reflexive b. Universal relation c. Equivalence relation d. Reflexive but not symmetric and transitive **5.** Mr. Shyam exercised his voting right in General Election – 2019, then Mr. Shyam is related to which of the following? a. All those eligible voters who cast their votes b. Family members of Mr.Shyam c. All citizens of India d. Eligible voters of India	
4	An organization conducted bike race under 2 different categories-boys and girls. Totally there were 250 participants. Among all of them finally three from Category 1 and two from Category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college project.  Let B = {b1,b2,b3} G={g1,g2} where B represents the set of boys selected and G the set of girls who were selected for the final race. Ravi decides to explore these sets for various types of relations and functions On the basis of above information answer the following questions (a) Ravi wishes to form all the relations possible from B to G. How many such relations are possible? (b) Ravi wants to know among those relations, how many functions can be formed from B to G?	

	(c) Let R: B→B be defined by R = {(x,y): x and y are students of same sex}, Then check relation R is equivalence relation (d) Let R: $B \to G$ be defined by R = { (b1,g1), (b2,g2),(b3,g1)}, then whether R is injective and surjective (e) How many one-one function defined from B to G	
5.	Raji visited the Exhibition along with her family. The Exhibition had a huge swing, which attracted many children. Raji found that the swing traced the path of a Parabola as given by $y = x^2$.  Answer the following questions using the above information. (a) If $f: R \to R$ be defined by $f(x)=x^2$, then show that f is neither one-one nor onto (b) If $f: N \to N$ be defined by $f(x)=x^2$, then show that f is one-one not onto (c) Let f: {1,2,3,….}→{1,4,9,….} be defined by $f(x)=x^2$ show that f is one-one and onto (d) The function f: Z→Z defined by $f(x)=x^2$ is show that f is neither one-one nor onto	
6	Students of Grade 9, planned to plant saplings along straight lines, parallel to each other to one side of the playground ensuring that they had enough play area. Let us assume that they planted one of the rows of the saplings along the line $y=x-4$. Let L be the set of all lines which are parallel on the ground and R be a relation on L.  Answer the following using the above information. **1.** Let relation R be defined by R = {($L1$,$L2$): $L1 \parallel L2$ where L1,L2 ∈ L} then R is_____ relation (a) Equivalence (b) Only reflexive (c) Not reflexive (d) Symmetric but not transitive **2.** Let R = { ($L1$,$L2$): $L1 \perp L2$ where L1,L2 ∈ L } which of the following is true? (a) R is Symmetric but neither reflexive nor transitive (b) R is Reflexive and transitive but not symmetric (c) R is Reflexive but neither symmetric nor transitive (d) R is an Equivalence relation **3.** The function f: R→R defined by $f(x)=x-4$ is_____ (a) Bijective (b) Surjective but not injective (c) Injective but not Surjective (d) Neither Surjective nor Injective **4.** Let $f: R \to R$ be defined by $f(x)=x-4$. Then the range of $f(x)$ is _____ (a) R (b) Z (c) W (d) Q **5.** Let R = {(L 1 , L 2) : L 1 is parallel to L 2 and L 1 : y = x – 4} then which of the following can be taken as L 2 ? (a) 2x-2y+5=0 (b) 2x+y=5 (c) 2x + 2y + 7 =0 (d) x+y=7	