

DEPARTMENT OF SCHOOL EDUCATION



STRUCTURED LESSON PLANS FOR CBSE-AFFILIATED SCHOOLS

PHYSICS

GRADE-10



A Teacher Resource Book for
Competency Based Teaching-Learning

STATE COUNCIL OF EDUCATIONAL



RESEARCH AND TRAINING (SCERT)

Committee for Development of Structured Lesson Plans

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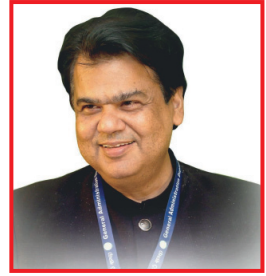
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MESSAGE BY PRINCIPAL SECRETARY

It brings me a great joy to invite all the teachers of CBSE-affiliated government schools to this valuable resource book of structured lesson plans. Inspired by the vision of our honorable Chief Minister, we are committed to supporting the teachers in shaping a bright future for all the children in Andhra Pradesh. We envision our children transforming into global citizens, excelling in academics and being ready for the world of work. In order to aid the teachers in this pivotal task of preparing the students to emerge as global citizens, the School Education Department is committed to making available the best resources and training. This lesson plans resource book is a transformational step in that direction. Utilized appropriately, this resource books will transform the teaching-learning process and experience in the classroom and lead to deeply engaging the students.

I hope you make the best use of this resource, which has been put together by our own teachers trained by experts from Azim Premji University and facilitated by the Center for Research in Schemes and Policies (CRISP). They have taken into consideration the teaching-learning needs of all types of learners and created lesson plans that are rich in activities, examples, and assessments. They have followed the CBSE Learning Framework and NCERT Learning Outcomes for Secondary Stage, along with principles from the National Curriculum Framework: School Education 2023.

At the crucial juncture of secondary school, our children need spirited teachers like you to prepare them for the changing and dynamic world. You bear the power and responsibility to shape their minds and hearts and guide them to step out into the world and contribute to our state's growth and country's economy.

Your dedication and efforts in implementing these structured pedagogical approaches will not only enhance the learning experience of our students but also equip them with the necessary skills and knowledge to thrive in an ever-evolving global landscape. Together, let us embark on this journey of educational excellence and empower our students to become the leaders of tomorrow.

With great hope and appreciation,

Shri Praveen Prakash, IAS
Principal Secretary, Department of School Education
Government of Andhra Pradesh



MESSAGE BY COMMISSIONER

The United Nations Sustainable Development Goal 4 (SDG 4) underscores the pivotal role of education in unleashing human potential and fostering self-respect. As the Commissioner of School Education, I am privileged to champion a vision that empowers the children of Andhra Pradesh with boundless possibilities and opportunities. Through pioneering reforms in education, encompassing cutting-edge infrastructure, ongoing professional development for educators and administrators, innovative digital initiatives, and an unwavering commitment to providing top-tier educational resources, our state stands as a beacon of educational transformation.

Government of Andhra Pradesh is committed to implement best initiatives to enhance the quality of education in the State. Obtaining CBSE affiliation to 1000 schools is one of such key initiatives. This lesson plan resource book developed for the use of teachers working in CBSE schools represents yet another milestone in our journey. Recognizing teachers as the cornerstone of our education system, we have entrusted them to craft these lesson plans for your benefit. After undergoing rigorous training in pedagogy, subject matter, learning outcomes and competencies, our educators have infused these lesson plans with their profound knowledge of the subject, and understanding of our students and their diverse contexts. It is a labor of love and thought, an amalgamation of explorations and experiments, presented for you to embrace and utilize effectively.

These lesson plans are created with the aim of providing a rich repository of ideas to enhance classroom engagement and productivity, and provide yet another innovative resource that teachers can employ. Feel free to adapt and supplement these plans as you see fit. The teacher reflections section serves as a tool for self-assessment and improvement, allowing you to augment your lessons and address any gaps you may identify.

I am optimistic about our state's trajectory towards competency-based teaching, with a focus on measurable learning outcomes that can be continually evaluated and enhanced. The decision to affiliate 1000 schools with CBSE and implement a curriculum aligned with national standards is indeed a significant stride in the right direction. Together, let us embrace this transformative journey towards educational excellence and empower our students to thrive in an ever-evolving world.

I congratulate everyone who worked towards bringing this excellent resource book for the teachers. I thank Center for Research in Schemes and Policies (CRISP) for the innovative ideas they presented to the Government, including development of structured lesson plans. The support of SPD Samagra Shiksha, continuous facilitation by CRISP, expert technical advice of Azim Premji University faculty, hard work of our teachers, CBSE team in Commissionerate office and SCERT made it possible to bring out this resource book in time for the 2024-25 academic year.

**With sincere optimism and appreciation,
Shri S Suresh Kumar, IAS
Commissioner,
Department of School Education,
Government of Andhra Pradesh**

MESSAGE BY THE STATE PROJECT DIRECTOR



The National Education Policy 2020 highlights that the purpose of education is to develop good human beings capable of rational thought and action, possessing compassion and empathy, courage and resilience, scientific temper and creative imagination, with sound ethical moorings and values. It aims at producing engaged, productive, and contributing citizens for building an equitable, inclusive, and plural society as envisaged by our Constitution. To realize the NEP's vision, it is essential for educators to align with this goal and transition from curriculum-centric to competency-driven teaching methods.

The State's commitment to this shared vision is visible in the Strengthening Andhra's Learning Transformation (SALT) Project, where one of the pivotal focus areas is the professional development of teachers. This entails utilizing insights from self-assessments, academic performance data from school-based evaluations, and classroom observations to enhance pedagogical skills. With continuous support from the education department, teachers will refine their pedagogical approaches, ensuring effective delivery of lessons.

In the same vein, I am delighted to introduce this Lesson Plan resource book for our CBSE-affiliated schools, crafted by experts from both within our state and across the nation. These lesson plans signify a shift away from rote memorization and content accumulation towards a structured approach aimed at fostering values, dispositions, and competencies in students. Rooted in the vision of the NEP and operationalized by the National Curriculum Framework: School Education 2023, each plan corresponds to a 40-minute class targeting specific learning outcomes from NCERT's Secondary Stage. These outcomes collectively contribute to observable learning achievements and the development of competencies over time. Moreover, this resource book empowers teachers to tailor their content and assessments dynamically by monitoring and addressing students' learning needs continuously.

I hope the teachers will find these resources valuable and helpful in transforming classroom transactions. Together I hope we will reshape the educational landscape of Andhra Pradesh in the years ahead. Best wishes for your endeavors!

Shri B Srinivasa Rao, IAS
State Project Director, Samagra Shiksha
Government of Andhra Pradesh



MESSAGE BY JOINT DIRECTOR, CBSE

In a landmark decision, the Government of Andhra Pradesh affiliated 1000 Government schools with the Central Board of Secondary Education (CBSE). This transition marks a significant milestone in our efforts to provide standardized and high-quality education to our students. The CBSE curriculum is widely recognized for its comprehensive and contemporary approach to learning, offering students a competitive edge on a national scale. The Board emphasizes holistic development of learners by providing a stress-free learning environment that will develop competent, confident and enterprising citizens who will promote harmony and peace. It is committed to providing quality education to promote intellectual, social and cultural vivacity among its learners.

By aligning our schools with CBSE, we aim to ensure our students are well-prepared to compete on a national level and excel in today's dynamic world. In order to achieve this, our utmost efforts have gone into developing these structured lesson plans incorporating NCERT's Secondary Stage Learning Outcomes, the National Curricular Framework: School Education 2023, and CBSE Learning Framework document developed by Azim Premji University. 'Structured Pedagogy' is a scientific, evidence-based, learner-centric approach for teaching that equips every teacher with clearly defined objectives, proven methods, well-structured tools, and practical training. After many rounds of rigorous training, expert teachers from our CBSE schools integrated the conceptual and practical aspects of their subjects and condensed them into these easy-to-use lesson plans.

We thank the Center for Research in Schemes and Policies (CRISP) and Azim Premji University for their innovative ideas and tireless support.

I encourage each of you to fully utilize these plans and personalize them to fit your teaching style. May this invaluable resource serve as a valuable tool as you guide Grade 10 students through this critical stage of their education. Your dedication as teachers brings us immense joy and pride, as we entrust the future of our state's children to your capable hands. Wishing you all the best!

Mr Krishna Reddy
Joint Director, CBSE
Department of School Education
Government of Andhra Pradesh

MESSAGE BY CENTRE FOR RESEARCH IN SCHEMES AND POLICIES (CRISP)



Shri. R. Subrahmanyam
I.A.S.(Retd), Secretary of CRISP



Ms. K. Sandhya Rani
IPoS.(Retd), Founding member of CRISP



Mrs. P. Usha Kumari
I.A.S.(Retd), State Lead of AP
Team CRISP

In October 2023, the Centre for Research in Schemes and Policies (CRISP) forged a significant partnership with the Government of Andhra Pradesh, to help bring about a transformation for the state's School Education system. Our inaugural initiative was designed to cultivate excellence within the 1000 CBSE-affiliated schools. CRISP's primary focus was to support both teachers and students during the transition from the State Board to the CBSE Board.

Research reveals that an average teacher grapples with approximately 1,500 decisions daily. While it may be impractical to intervene in every decision-making process, our aim was to alleviate the cognitive load associated with tasks such as lesson planning, question formulation, activity design, and assessment creation. Recognizing the novelty of transitioning from the State Syllabus to CBSE, our initiative encompassed the provision of essential resources alongside comprehensive training for all educators involved.

To enhance our efforts, we collaborated with Central Square Foundation, a renowned organization in the field of Education, to train our teachers in their Structured Pedagogy approach. This evidence-based, learner-centric methodology equips educators with clearly defined objectives, proven methods, well-structured tools, and practical training.

We are thankful to professors from Azim Premji University who provided invaluable support by mentoring the core group of teachers over a six-month period, guiding them through NCERT's Learning Outcomes for the Secondary Stage and the National Curriculum Framework: School Education 2023. The culmination of these efforts is the creation of this resource book, comprising structured lesson plans for the benefit of teachers, and vetted meticulously by the SCERT. We hope that the tremendous effort of our teachers serves as an inspiration to continue shaping the minds of our youth.

We extend our sincere gratitude to Dr. Emmanuel Joseph, Joint Commissioner (Academics) at CBSE, New Delhi, professors from Azim Premji University, experts from Central Square Foundation, the State CBSE team, SCERT, and the entire Department of School Education for their invaluable guidance and support throughout this endeavor. Their deep commitment to enhance the quality of education and to transform the teaching-learning process in the classrooms made it possible to bring this initiative to life within a remarkably short span of time.

We thank the Government of Andhra Pradesh for giving us this opportunity, for the trust they reposed in accepting the innovative idea and facilitating it to germinate and fructify.



FOREWORD BY DIRECTOR, SCERT

At the heart of quality education lie two indispensable pillars: the teacher and the student. While textbooks, digital resources, infrastructure, and curriculum play crucial roles in the educational landscape, it is the teacher who bears the primary responsibility of delivering lessons, facilitating comprehension of complex concepts, nurturing independent thinking, and molding individuals into responsible members of society. The Department of School Education, Government of Andhra Pradesh aspires to create citizens equipped with the skills and competencies to succeed and solve problems at a global scale, while remaining locally rooted and aware.

To achieve this goal, we have developed a comprehensive resource book to support teachers across the state, enhancing their planning and teaching processes with ease and creativity.

These meticulously crafted lesson plans have been curated by trained educators and thoroughly reviewed by SCERT experts. Each lesson plan is structured into distinct period plans, addressing specific topics within the lesson. Clear learning outcomes are outlined at the beginning of each lesson and progressively addressed throughout the class session. Furthermore, each period plan is divided into sections including Learning Outcomes, Teaching-Learning Process, Pointers for Assessment, and Material Required, offering teachers a flexible framework to tailor to their preferences. The provided questions to assess prior knowledge, suggested activities, and prompts for understanding checks serve as guides, encouraging teachers to adapt the plans to suit the unique needs of their classroom and students.

The SCERT extends its sincere appreciation to the dedicated members of its textbook committee, source material reviewers, lesson plan creators, and technical partners for their invaluable contributions in realizing this vision. We also express our gratitude to the Principal Secretary and Commissioner, Department of School Education, and State Project Director, Samagra Siksha, Department of School Education for their steadfast commitment to promoting quality education, consistently driving us toward excellence in all facets. We appreciate the steadfast support of Center for Research in Schemes and Policies (CRISP) and professors from Azim Premji University in developing the lesson plans.

Dr B Pratap Reddy
Director,
State Council of Educational, Research, and
Training Government of Andhra Pradesh

INTRODUCTION AND BACKGROUND TO THE STRUCTURED LESSON PLANS RESOURCE BOOK

The National Education Policy, 2020 (NEP) focuses strongly on a need for a well-defined Curriculum and a Structured Pedagogy in schools, to ensure holistic, integrated, enjoyable and engaging learning of the students.¹ In pursuance of the Memorandum of Understanding (MoU) signed between Government of Andhra Pradesh (GoAP) and Centre for Research in Schemes and Policies (CRISP), and the recommendation made by CRISP in the Action Plan for CBSE, GoAP agreed that *“Structured pedagogy should be adopted for Classes 8 and above in the newly converted CBSE schools. For this purpose, while using material already available, standard lesson plans should be prepared.”* In furtherance of adapting structured pedagogy approach in Government CBSE Schools to improve the quality of teaching-learning, the GoAP organized the following:

1. Organised a Structured Pedagogy workshop was organized in collaboration with CRISP in Vijayawada from 11th to 13th July 2023. Experts from Central Square Foundation and Azim Premji University (APU) anchored the workshop, with additional sessions by Room to Read, Leadership for Equity, Ambitus World School, and SCERT Telangana. Sessions focused on the need for a structured way of teaching and learning, shifting from rote method to competency based curriculum, and delved into the NCERT Learning Outcome Framework for the Secondary Stage. A total of 60 subject teachers along with A.P SCERT subject experts participated in the workshop representing English, Mathematics, Social Science, Biology, Chemistry, and Physics. Each subject group consisted of 10 teachers, 1 SCERT expert, and 1 CBSE School Principal acting as a Coordinator. With guidance from CSF and APU, the subject groups prepared one sample lesson plan per subject by the end of the 3-day workshop.
2. Post the workshop, facilitated the expert subject teachers to work on lesson plan development, with virtual support from APU faculty virtually.
3. Organised a Capacity Building workshop from 11th to 14th October 2023 in Vijayawada with expert support of experts from APU. Sessions were held on mapping content to specific learning competencies, designing and using creative Teaching-Learning Materials, adding Check for Understanding questions, using interdisciplinary approach in the lessons, addressing student misconceptions, and creating a diverse range of assessments. The workshop enhanced the ability of the teachers to

¹Chapter 4 & 5, National Education Policy, 2020 (NEP, 2020)

- a. understand the principles and practices underpinning competency-based curriculum as outlined in NEP 2020 and NCF-SE 2023;
 - b. equip the teachers to analyse the need to effectively align curriculum content, competencies, pedagogical practices, and assessment methods in the classroom;
 - c. helped them to learn to develop competency-based lesson plans that integrate NCF-SE 2023 guidelines, ensuring that learning outcomes are aligned to the desired competencies with the help of model lesson plans
 - d. trained them to gain practical insights into designing and implementing both formative and summative assessments that accurately measure students' progress toward achieving the competencies set forth in NCF-SE 2023
4. Held a physical camp for the core team of teachers to develop and quality check the lesson plans for all the subjects in Vijayawada for 12-days, from 20th November to 1st December 2023. APU teachers and Leadership for Equity team provided technical support.
 5. In early February 2024 the lesson plans developed for Grade 9 and 10 were vetted and finalised by AP SCERT and sent to the Textbook Press for printing and distribution.

ELEMENTS OF THE STRUCTURED LESSON PLANS

All lesson plans are meticulously organized into detailed period plans, each focusing on a specific topic and its corresponding Learning Outcomes. These period plans are then subdivided into four essential sections:

1. Topic and Learning Outcomes, along with associated Indicators
2. Teaching-Learning Process, highlighting Pedagogical Strategies
3. Assessment Strategies to gauge student understanding and progress
4. Materials required, ensuring all necessary resources are readily available for effective instruction.

Within these sections, the following elements have been covered:

- **Higher order thinking questions** have been added to encourage critical thinking, problem-solving, creativity, and analysis. These questions usually move beyond 'What', and 'When', and focus on 'Why', or 'How'. Some examples of these are:
"Explain the twinkling of stars." [Physics]
"How does trade help connect the countries in the world?" [History]

“Why can amphibians and reptiles tolerate mixing of blood to some extent?”

[Biology]

“Do you think it was right for the farmer to be angry with the postmaster? Why or why not? [English]

“What should India do or achieve to become a developed country?” [Economics]

“Why does a snail change its sex?” [Biology]

“How did Gendhadhur, a backward village in Mysore, Karnataka, become rich in rain water?” [Geography]

“Why can’t astronauts see the rainbow from the surface of the moon?” [Physics]

- **Keywords and key concepts** are stated in the beginning of every chapter so that the teacher can be sure to cover them during the course of the lesson
- **Prior knowledge and skills are tested** at the beginning of every period to assess whether students have retained concepts covered in previous lessons, and to gauge the overall level of knowledge on the topic to be covered
- **Prompts and questions to address common misconceptions** about the topic have been given in the plans to clarify any incorrect ideas students may have. For example: “A woman in your neighborhood is blamed for giving birth to a baby girl. Is the sex of the baby determined by her? Remove the misconception through your argument.” [Biology]
- **Discussion prompts** for class or group discussions have been given, especially for the humanities subjects. For example:
“Why do you think men receive higher wages than women for the same job? Discuss.” [Economics]
“Human societies have steadily become more interlinked. Comment.” [History]
“Discuss the benefits and drawbacks of using chemical fertilizers.” [Geography]
- **Assessment and remedial periods** have been allocated after every lesson plan to gauge student learning, and revise concepts that students need more clarity or practice in, before moving to the next lesson
- **Inter-disciplinary nature of subjects and topics** has been encouraged in the plans so that students recognize the value of all subjects equally. It also promotes a holistic understanding of the topic and opens them up to thinking about an issue from various lenses
- **Formative and summative assessments, check for understanding questions, and worksheets** are given for every lesson to assess student learning at every stage of the lesson
- **Space for teachers to reflect on every period** has been provided at the end of the plan. The prompts are designed to assist teachers in assessing the alignment of their plan with overarching curricular goals and competencies, evaluating student engagement levels, ensuring effectiveness of assessment strategies in measuring student understanding, and gauging the efficacy of teaching materials, activities, and case studies utilized

HOW TO USE THESE LESSON PLANS

Teachers should have a comprehensive understanding of the curricular goals, competencies, and the nature of the subject they teach. It is essential to thoroughly review the section on "Pedagogical Practices" to gain deeper insight into teaching methodologies. With this groundwork, teachers can then delve into the lesson plans for their subject. It is highly recommended to study the entire lesson plan before initiating the lesson in class. Throughout the lesson, teachers can refer to each period plan and manage class time effectively to cover the elements outlined in the plan. Additionally, teachers are encouraged to modify the plan as needed, incorporating or removing content, questions, or activities to address the specific needs of their students and contextual requirements.

PEDAGOGICAL PRACTICES

Broad Aims of School Education

The Learning Standards are guided by certain widely agreed upon broad Aims of School Education that are articulated in this NCF. These aims have been arrived at from the vision and purpose of education as envisaged by NEP 2020:

- 1. Rational Thought and Autonomy:** An individual should have the capacity of rational reasoning and sufficient knowledge to understand the world around them. An individual should be able to make an informed decision. This fundamentally requires knowledge in breadth and depth.
- 2. Health and wellbeing:** School education should be a wholesome experience for students. Students should acquire Knowledge, Capacities, and Dispositions that promote mind-body wellness.
- 3. Democratic participation:** This requires appropriate knowledge capacities, values, and dispositions so that an individual may be oriented towards sustaining and improving the democratic functions of Indian society.
- 4. Economic participation:** Education should work as an enabler for a healthy democracy as well as a healthy economy.
- 5. Cultural and social participation:** Along with democracy and economy, society, and culture also play an important role in the mode of associated living. An individual should acquire capacities and a disposition to contribute meaningfully to culture.

NATURE OF THE SUBJECT: SCIENCE

(Adapted from the CBSE Learning Standards document. Please refer to it here: https://cbseacademic.nic.in/cbe/documents/Learning_Standards_Science.pdf)

Among many ways in which the inquiring and imaginative human mind engages, expresses, and explains nature's wonder is through science. It is a human endeavour that observes the physical and biological environment carefully, looks for any meaningful patterns, processes,

and relations, making and using new tools to interact with nature, and building conceptual models to understand the world. Also, the knowledge developed helps understand the evolutionary past, current state and predict the future of humanity and nature. It provides us with a way to present ideas that can be tested, repeated, and verified. Scientists gather evidence (as opposed to “proof”) to support or falsify hypotheses. Theories, laws, and principles are supported, modified, or replaced as new evidence appears and are central to scientific thinking.

Despite many attempts to shrug it off in textbook chapters and a note to the teacher section, the prevailing perception on the nature of doing science is through the scientific method and not a scientific method. And that method is linear. This perception of the nature of doing science needs countering, for the art of doing science is a creative, iterative, and interconnected process built on curiosity, healthy scepticism, and questioning.

While science is at its best in understanding simple linear systems of nature, its predictive or explanatory power is limited when it comes to dealing with nonlinear complex systems of nature. Yet, with all its limitations and failings, science is unquestionably the most reliable and powerful knowledge system about the physical world known to humans, augmenting the spirit of enquiry, creativity, objectivity, and aesthetic sensibility leading towards the development of scientific temper. The school science curriculum across classes could gradually nurture scientific temper through appropriate learning opportunities.

NCF 2005 position paper on teaching of science at secondary stage emphasises the learning of science as a composite discipline, in doing so, it encourages the designing of advanced technological modules, analysing issues of health and the surrounding environment, and experimenting systematically to discover and verify theoretical principles.

In a progressive forward-looking society, science can play a truly liberating role, helping people out of the vicious circle of poverty, ignorance, and superstition. In a democratic political framework, the possible aberrations and misuse of science can be checked by the people themselves. Science, tempered with wisdom, is the surest and the only way to human welfare. This conviction provides the basic rationale for science education.

The structured lesson plans in this book are rooted in the vision of the National Education Policy 2020, operationalized by the National Curriculum Framework: School Education 2023, and based on the Learning Outcomes from NCERT’s Learning Outcomes at the Secondary Stage. The following content has been adapted from the original documents to provide context and explanation for the pedagogical practice behind the development of these lesson plans.

NCERT Curricular Expectations for the Secondary Stage:

For detailed Learning Outcomes and suggested Pedagogical Processes, please refer to the [NCERT Learning Outcomes at Secondary Stage](#)

SCIENCE Curricular Expectations

At this stage learners are expected to:

- develop understanding of concepts, principles, theories, and laws governing the physical world, consistent with the stage of cognitive development.
- develop the ability to acquire and use the methods and processes of science, such as observing, questioning, planning investigations, hypothesising, collecting, analysing and interpreting data, communicating explanations with evidence, justifying explanations, thinking critically to consider and evaluate alternative explanations, etc.
- conduct experiments, also involving quantitative measurements.
- appreciate how concepts of science evolve with time giving importance to its historical perspective.
- develop scientific temper (objectivity, critical thinking, freedom from fear and prejudice, etc.).
- nurture natural curiosity, aesthetic sense, and creativity.
- imbibe the values of honesty, integrity, cooperation, concern for life and preservation of the environment.
- develop respect for human dignity and rights, equity and equality.

For a more detailed explanation, please refer to the [National Curriculum Framework: School Education 2023](#) (p.45-51, p.88-92, p.101-102, p.116-121)

Aims of Science:

Science aims to develop an understanding of the natural and physical world through systematic inquiry. Learning Science also builds important capacities such as observation, analysis, and inference. This in turn enables the meaningful participation of individuals in society and the world of work with scientific temper, critical and evidence-based thinking, asking relevant questions, analysing practices and norms, and acting for necessary change. Science Education aims to achieve:

- a. Scientific understanding of the natural and physical world:** Scientific understanding develops through scientific observations, questions, experiments, theories, laws, principles and concepts. An adequate knowledge of these is essential to build a systematic and verifiable understanding of the way the natural and physical world functions.
- b. Capacities for Scientific enquiry:** The abilities to put forth hypotheses, arguments, predictions and analyses, and to test hypotheses, evaluate situations, and draw logical

conclusions, are fundamental to the learning of science. Science education must thus build these skills in students systematically over the stage in school.

- c. **Understanding the evolution of scientific knowledge.** There are crucial historical moments in the development of Science and scientific knowledge that could not have occurred without the efforts of various individuals and organisations over thousands of years. Understanding these key moments and discoveries will develop students' understanding of how scientific knowledge and the methods of science evolved and still evolve over time.
- d. **Interdisciplinary understanding between Science and other curricular areas:** Learning in science involves understanding interlinkages across disciplines. Students would learn to inquire and learn about the world through such an interdisciplinary approach.
- e. **Understanding of relationship between science, technology and society:** Engaging with issues related to connections between Science, Technology and Society including the ethical aspects and implications, and appreciating the role of science in addressing the challenges and the world is undergoing, will add to the breadth of students' learning.
- f. **Scientific temper:** Students will imbibe scientific values and dispositions such as honesty, integrity, scepticism, objectivity, tenacity, preservice, collaboration and cooperation, concern for life, and preservation of the environment.
- g. **Creativity:** Asking good questions, formulating hypotheses and designing good experiments to test those hypotheses often require artistry and creativity. Developing such creativity and a sense of aesthetic in the pursuit of scientific understanding and exploration is very important.

For more details on the Aims of specific subjects please refer to the NCFSE following pages: English: p234-267; Mathematics: p268-293; Science: p294-319; Social Science: p320-352.

CHAPTER – 9

LIGHT -REFLECTION AND REFRACTION



Aims of Education :

- ❖ Rational Thought and independent thinking.
- ❖ Democratic & Community Participation.

Nature of Science :

Develops

- ❖ Observation.
- ❖ Questioning
- ❖ Forming hypothesis
- ❖ Testing hypothesis
- ❖ Trough experiment
- ❖ Analysing evidence
- ❖ Curiosity
- ❖ Evidence based thinking

Aims of science related magnetic effects of electric current :

- ❖ Scientific understanding of the natural and physical world.

- ❖ Capacities for scientific inquiry.
- ❖ Understanding the evolution of scientific knowledge.
- ❖ Understanding the relation between science, technology and society.
- ❖ Inter disciplinary understanding between science and other curricular areas.
- ❖ Magnetic field strength, at different points around it.

CURRICULAR GOAL AND COMPETENCIES :

Curriculum Goal : Explores the physical world around them, and understands scientific principles and law's based on observations and analysis.

Competencies : Manipulates the position of the object and properties of lenses (Focus, centre of curvature) to observe image characteristics and correspondence with a ray diagram and extends this understanding to a combination of lenses.

Curriculum Goal :Explores the nature of science by doing science.

Competencies :Develops accurate and appropriate models for ray diagrams of spherical mirrors and draws ray diagrams for spherical mirrors.

Develops accurate and appropriate models for ray diagrams of spherical lenses and draws ray diagrams for spherical lenses.


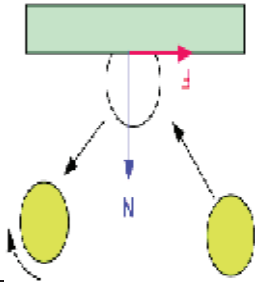
Period No.	Topic	Learning Outcomes
01	INTRODUCTION AND REFLECTION OF LIGHT	State the laws of reflection of light in order to understand how light travels in a medium when it encounters another object
02	SPHERICAL MIRRORS	Outline the rule of image formation by spherical mirrors in order to complete the ray diagrams by drawing reflected rays
03	IMAGE FORMATION BY SPHERICAL MIRRORS	Outline the rule of image formation by spherical mirrors in order to complete the ray diagram by drawing reflected rays
04	REPRESENTATION OF IMAGES FORMED BY SPHERICAL MIRRORS USING RAY DIAGRAMS	Represent the path of incident ray and reflected ray in order to decipher the position and nature of image formed.
05	SIGN CONVENTION FOR REFLECTION BY SPHERICAL MIRRORS, MIRROR FORMULA AND MAGNIFICATION	Express u , v , f in the mirror formula in order to apply sign convention in solving word problems to find the unknown variable.
06	REFRACTION OF LIGHT AND REFRACTIVE INDEX	Compare speed of light in one medium with another in order to calculate refractive index.
07	REFRACTION THROUGH RECTANGULAR GLASS SLAB	Demonstrates the path of light when it travels through a rectangular glass slab, in order to formulate laws of refraction of light.
08	REFRACTION BY SPHERICAL LENSES	Represent the path of incident and reflected light rays from a lens, in order to decipher the position nature of image formed.
09	IMAGE FORMATION BY LENSES-RAY DIAGRAMS OF CONVEX LENS	Illustrate the path of incident and reflected light rays from a convex lens, in order to decipher the position and nature of image formed.
10	IMAGE FORMATION BY LENSES-RAY DIAGRAMS OF CONCAVE LENS	Illustrate the path of incident and refracted light rays from a convex lens, in order to decipher the position and nature of image formed.
11	SIGN CONVENTION FOR SPHERICAL LENSES, LENS FORMULA AND MAGNIFICATION AND POWER OF LENS	Construct Lens formula for a lens relating u , v , f in order to find an unknown variable given other two. State the magnification for a lens, in order to relate height of object with height of image.

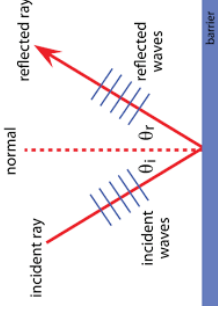

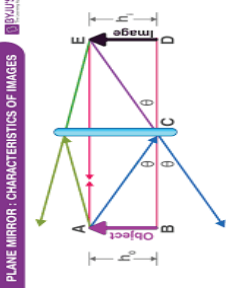
		Calculate the power of a Lens, in order to determine its power to converge or diverge.
12	WORK SHEET	



PERIOD PLAN - 1

Class : X
Chapter : Light-Reflection and Refraction
Total no. periods: 12 **Period:**1
Key Concepts : Introduction to Light

Learning Outcomes	Teaching Learning Process	Pointers for Assessment	Materials required
<p>Describes scientific discoveries/Inventions, such as discovery of various concepts under Reflection of Light.</p> <p>States the laws of reflection of light in order to understand how light travels in a medium when it encounters another object</p> <p>Explains working of Mirrors by the understanding reflection of light .</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ What makes things visible? ✓ In which path the light travels? <p>Teacher's activity:</p> <p>To understand this concept teacher give some examples.</p> <ul style="list-style-type: none"> ✓ Every day where do you comb your hair? ✓ Let's watch this picture on IFP and give response. 	<ul style="list-style-type: none"> ✓ Which type of image is formed in Plane mirror? ✓ Which property of light you can compare bouncing back of ball from wall? 	<p>Image on IFP</p>  



<p>Describes using poster, the Reflection of Light in Plane mirror.</p> <p>Student analyses the phenomena Involved in formation of images.</p>	<p>Let us discuss about Reflection of Light.</p> <ul style="list-style-type: none"> ✓ When you throw a ball towards a wall then the the ball bounces back. Similarly when Light falls on a plane mirror then it bounces back into the same medium. This phenomenon is called Reflection of Light. ✓ We know laws of Reflection of Light as below..... ✓ (i) Angle of incidence of light ray is always equal to the angle of reflection of light ray ✓ (ii) The incident light ray and the reflected light ray and Normal to the mirror at the point of incidence lie in the same plane. 	<ul style="list-style-type: none"> ✓ How the image appears on the surface of a spoon? ✓ Which property of light is responsible in forming images in a plane mirror? 	
<p>Student recalls the types of mirrors that work on Reflection of light.</p>	<ul style="list-style-type: none"> ✓ If you observe the image in plane mirror, the image is Virtual, erect, laterally inverted, having same size as object and the distance of the object is equal to the distance of the image from mirror. 	<ul style="list-style-type: none"> ✓ What is the relation between the angle of incidence and angle of reflection ? 	
<p>Student compares bouncing of ball and Reflection of Light.</p>		<ul style="list-style-type: none"> ✓ Mention the characteristics of image formed in plane mirror? <p>Q. Which of the following best describes the image formed by a plane mirror?</p> <ol style="list-style-type: none"> 1. virtual, inverted and enlarged 	<p>PLANE MIRROR - CHARACTERISTICS OF IMAGES</p> 
<p>Student draws the path of reflected light.</p>			


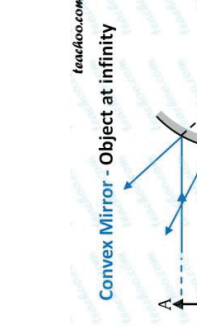
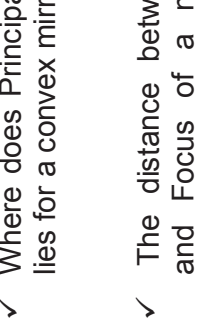
<p>Student relates the angle of Incidence and Angle of Reflection.</p> <p>Student gives applications of reflection of light.</p> <p>Student compares laws of Reflection of light in case of plane mirrors and spherical mirrors.</p> <p>Student describes the Laws of Reflection of light.</p>	<p>Let us discuss about applications of Reflection of Light. (15 min)</p> <ul style="list-style-type: none"> ✓ Take a large shining spoon. ✓ Try to view your face in its curved surface. ✓ Do you get the image? ✓ Is it smaller or large? ✓ Compare the characteristics of the image in both the cases. ✓ The curved surface of a shining spoon could be considered as curved mirror. ✓ The mirrors whose reflecting surfaces are spherical are called Spherical mirrors. <p>Let's check concept of Reflection of light once more:</p> <ul style="list-style-type: none"> ✓ What are the applications of Reflection of Light? ✓ Is there any difference between Laws of Reflection of Light and Laws of Reflection of Sound? ✓ Reflection of light plays important role in forming images in mirrors. ✓ Light follows Laws of Reflection of Light. ✓ In Next class we will learn more about spherical mirrors. 	<ul style="list-style-type: none"> 2. real, inverted and reduced 3. virtual, upright and the same size as object 4. real, upright and the same size as object <p>Q. When the image of an object is seen in a plane mirror, the distance from the mirror to the image depends on _____.</p> <ul style="list-style-type: none"> 1. the wavelength of light used for viewing. 2. the distance from the object to the mirror. 3. the distance of both the observer and the object to the mirror. 	<p>https://youtu.be/zIV_33P_kowY</p>
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Teacher reflections & Experiences: <ol style="list-style-type: none">1. Did I clearly communicate the lesson objectives to the students?2. How can I ensure that students understand the objectives and can demonstrate their knowledge or skills related to them?3. Did I use effective instructional strategies to engage students in the lesson?4. How can I improve the variety and effectiveness of my teaching methods to cater to different learning styles and needs?				

PERIOD PLAN - 2

Class : X
Chapter : Light-Reflection and Refraction
Total no. of Periods :12 **PERIOD** :2
Key Concepts : Spherical Mirrors

Learning Outcomes	Teaching Learning Process	Pointers for Assessment (previous questions)	Material required
<p>Describes scientific discoveries/ inventions, such as discovery of various concepts under Spherical mirrors.</p> <p>Outlines the rule of image formation by spherical mirrors in order to complete the ray diagrams by drawing reflected rays</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ How is the surface of the plane Mirror to touch? ✓ Which type of image is formed in the plane mirror? <p>Teacher's activity:</p> <ul style="list-style-type: none"> ✓ Surface of the spoon curved inwards can be approximated to a Concave mirror. ✓ Surface of the spoon bulged outward can be approximated to a Convex mirror. ✓ From above example the types of spherical mirrors can be identified as below: ✓ A spherical mirror, whose reflecting surface curved inwards is called Concave mirror. ✓ A spherical mirror whose reflecting surface is curved outward is called a Convex Mirror. 	<ul style="list-style-type: none"> ✓ What is the shape of inner surface of the spoon ? ✓ What is the shape of outer surface of the Spoon? <ul style="list-style-type: none"> ✓ Identify the Pole of a spherical mirror? ✓ Denote the centre of curvature of a spherical mirror? 	<p>image on IFP</p>  

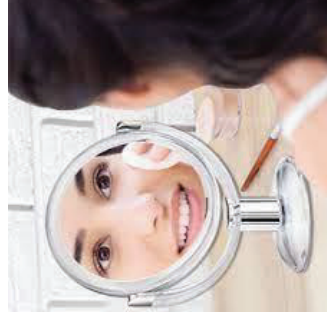
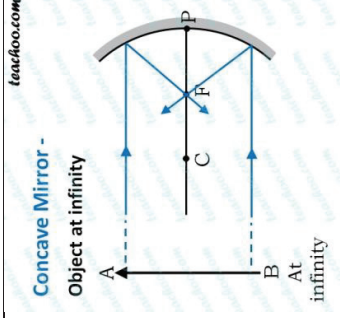
<p>Presents the role of Reflection of light in Understanding the properties of spherical mirrors.</p> <p>Describes using poster, the Reflection of light in spherical mirrors.</p>	<p>Let's watch this picture on IFP and give response.</p> <p>Presentation of content:</p> <ul style="list-style-type: none"> ✓ The centre of the reflecting surface of a spherical mirror is a point called Pole. ✓ The centre of the sphere in which spherical mirror forms a part is called centre of curvature. ✓ The centre of curvature of concave mirror lies in front of it. ✓ The centre of curvature of Convex mirror lies behind the mirror. ✓ The line passing through the pole and centre of curvature is called Principal axis. ✓ Hold a concave mirror in your hand and direct its reflecting surface towards the Sun. ✓ Move the sheet of paper back and forth until you find bright, sharp spot of light. begins to burn producing smoke. ✓ A number of rays parallel to the principal axis falling on a Concave mirror are reflected and meet at a point called principal focus(F). ✓ A number of rays parallel to the 	<ul style="list-style-type: none"> ✓ Where do you find centre of curvature in case of convex mirror and in case of concave mirror? ✓ Draw the Principal Axis of a spherical mirror? ✓ Where does Principal Focus lies for a convex mirror? ✓ The distance between pole and Focus of a mirror is called _____. ✓ Identify the following mirrors? 		 <p>Convex Mirror - Object at infinity</p>	
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principal axis falling on a Convex mirror are appears to be diverging from a point called principal focus(F).

- ✓ The distance between the pole and the principal focus is called Focal length(f).

Let's check concept of Spherical mirrors once more:

- ✓ What are the types of spherical mirrors?
- ✓ Draw the ray diagrams to get Focus in case of Convex mirror and Concave mirror?
- ✓ Reflection of light plays important role in the design of convex and concave mirrors.
- ✓ Spherical mirrors follows Laws of Reflection of Light.
- ✓ In Next class we will learn about Image formation in Spherical mirrors.





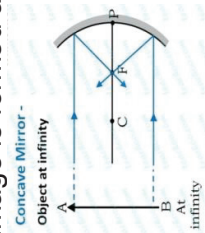

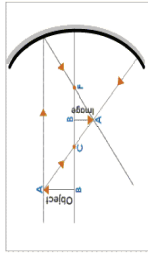
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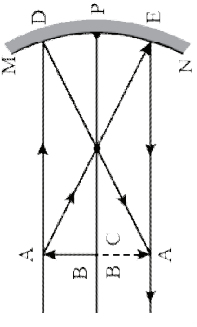
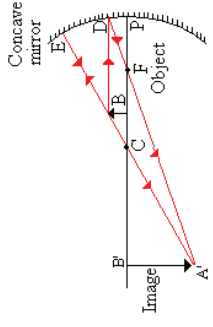
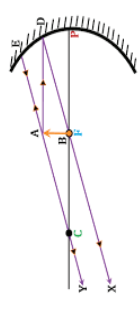
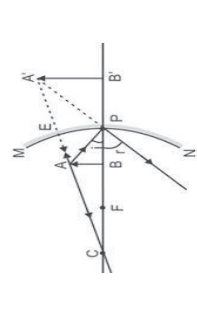
Teacher reflections & Experiences:


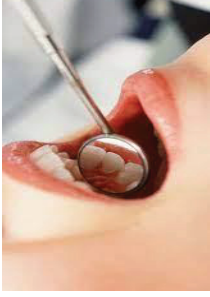

1. How well did I manage the classroom during the lesson?
2. Were there any disruptions or behavioral issues that I need to address?
3. What strategies can I implement to improve classroom management?
4. Did the students actively participate and show interest in the lesson?


PERIOD PLAN - 3

Class : X
 Chapter : Light-Reflection and Refraction
 Total no.of periods : 12 PERIOD : 3
 Key Concepts : Image formation by Spherical Mirrors (9.2.1 in Text book)

Learning Outcomes	Teaching Learning Process	Pointers for Assessment	Material required
<p>Describes scientific discoveries/ inventions, such as discovery of various concepts under Refraction of Light.</p> <p>Outlines the rule of image formation by spherical mirrors in order to complete the ray diagram by drawing reflected rays</p> <p>Presents the role of</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ Identify the size of the image in plane mirror? ✓ Name the mirror which has bulging inwards? <p>Teacher's activity:</p> <ul style="list-style-type: none"> ✓ Let us discuss about Ray diagrams of Concave Mirror. ✓ When the object is at infinity then highly diminished, real and inverted image is formed at its focus. <div style="text-align: center;">  <p>Concave Mirror - Object at Infinity</p> </div> <ul style="list-style-type: none"> ✓ When the object is placed beyond Centre of curvature(C) of a Concave mirror then diminished real and inverted image is formed in between 	<p>(previous knowledge)</p> <ul style="list-style-type: none"> ✓ How is the size of the image in the mirror shown in picture? ✓ List the characteristics of the image when the parallel beam of light incident on a Concave mirror? <ul style="list-style-type: none"> ✓ Draw the position and nature of the image when the object is place beyond centre of curvature of a Concave mirror? 	<p>image on IFP</p> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div>


<p>Reflection of light. To draw the ray diagrams of Concave mirror.</p> <p>Describes uses of concave mirror.</p>	<p>F and C.</p> <ul style="list-style-type: none"> ✓ When the object is placed at Centre of Curvature then Real, Inverted image of same size is formed on Centre of curvature again. ✓ When the object is placed between Centre of Curvature and Focus then enlarged, real and inverted image is formed beyond C. 	<ul style="list-style-type: none"> ✓ Mention the position and nature of the image when the object is placed at centre of curvature of a Concave mirror? ✓ Describe the position and nature of the image when the object is placed between centre of curvature and focus of a Concave mirror? 	 
<p>Student analyses the phenomena involved in working of shaving mirror.</p>	<ul style="list-style-type: none"> ✓ When the object is placed at Focus (F) then highly enlarged, real and inverted image is formed at infinity. ✓ When the object is placed between pole and focus of a Concave mirror? 	<ul style="list-style-type: none"> ✓ Explain the position and nature of the image when the object is placed at focus of a Concave mirror? ✓ Identify the position and nature of the image when the object is placed between pole and focus of a Concave mirror? 	<p style="text-align: center;">Concave or Converging Mirror</p>  <p style="font-size: small;"> Position of Object - at F. Position of Image - at infinity. Properties of the image - highly enlarged, real and inverted. </p> 

	<p>Let us discuss about applications of Concave mirror. Concave mirrors are commonly used in</p> <ul style="list-style-type: none"> ✓ Torches ✓ Search lights ✓ Vehicles head lights ✓ Solar furnaces ✓ As shaving mirrors ✓ And also used by Dentist to see enlarged image of teeth. <p>Let's check concept of Image formation of spherical mirrors.:</p> <ul style="list-style-type: none"> ✓ Draw the Ray diagrams of Concave mirror? ✓ What are the applications of Concave mirror? ✓ In Next class we will learn more about Representation of images formed by spherical mirrors ✓ Let's watch a video ON ✓ IFP.https://youtu.be/9ASkbw_AKV8 ✓ https://youtu.be/QMEIx44Ikss 	<ul style="list-style-type: none"> ✓ Which mirror is used as Shaving mirror ✓ Give the name of the mirror used by Dentist? ✓ Name the type of mirrors used in head light of a car? ✓ Name the mirror used in Solar Furnace? <p>Q. The mirror which can form a magnified image of an object is :</p> <p>(a) convex mirror (b) plane mirror (c) concave mirror (d) both convex and concave mirror.</p>	  
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<p>Teacher reflections & Experiences:</p> <ol style="list-style-type: none">1. How can I increase student engagement and create a more interactive learning environment?2. Did I assess student understanding effectively during the lesson?3. Did I provide timely and constructive feedback to guide their learning?4. How can I improve my assessment and feedback practices?			

PERIOD PLAN - 4

Class : X
 Chapter : Light-Reflection and Refraction
 Total periods : 12 PERIOD : 4
 Key Concepts : Representation of images formed by spherical mirrors using Ray diagrams

Learning Outcomes	Teaching Learning Process	Pointers for Assessment (previous questions)	Material required
<p>Describes scientific discoveries/ inventions, such as discovery of various concepts under Reflection of Light.</p> <p>Represents the path of incident ray and reflected ray in order to decipher the position and nature of image formed.</p> <p>Draws the ray diagrams of Convex mirror.</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ Which mirror forms magnified image? ✓ Concave mirror forms which type of image? <p>Teacher's activity:</p> <ul style="list-style-type: none"> ✓ Discuss about image formation by spherical mirrors. ✓ The intersection of at least two reflected rays give position of image of the point object. ✓ A ray parallel to the principal axis , after reflection will pass through the principal focus in case of a concave mirror or appear to diverge from the principal focus in case of a convex mirror. ✓ A ray passing through the principal focus of a concave mirror or a ray 	<ul style="list-style-type: none"> ✓ Name the phenomena that takes place in the formation of image in a concave mirror? ✓ What is the path of the parallel ray incident on the spherical mirror after reflection? ✓ What is the path of the reflected ray when a light ray passing through principal 	<p>image on IFP</p> 

<p>Describes uses of Convex mirror.</p>	<p>which is directed towards the principal focus of convex mirror after reflection, will emerge parallel to the principal axis.</p> <ul style="list-style-type: none"> ✓ A ray passing through the centre of curvature of a concave mirror or directed in the direction of the centre of curvature of a convex mirror after reflection it reflected back along the same path. ✓ A ray incident obliquely to the principal axis, towards a point Pole P on the concave mirror or a convex mirror is reflected obliquely. <p>Let's watch this picture on IFP and give response.</p> <p>Let us discuss about Ray diagrams of Convex Mirror.</p> <ul style="list-style-type: none"> ✓ When the object is at infinity then the Convex mirror forms highly diminished, virtual and erect image is formed at its focus(F). ✓ When the object is placed between infinity and the pole(P) of the Convex mirror then diminished virtual and erect image is formed between Pole and Focus behind the mirror. ✓ Let us discuss about applications of Convex mirror. 	<p>focus incidents on spherical mirror?</p> <ul style="list-style-type: none"> ✓ Trace the path of the reflected ray when a light ray passing through centre of curvature incidents on spherical mirror? ✓ Identify the path of the reflected ray when a light ray incidents obliquely on the pole of spherical mirror? ✓ What is the nature of the image formed by the Convex mirror when the object is at infinity? ✓ What is the nature of the image formed by the Convex mirror when the object is 	
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Convex mirrors are commonly used in

- ✓ Rear view (wing) mirrors because they have more field of view and also forms erect and virtual image
- ✓ Tajmahal can be seen through Convex mirror placed at Agra Fort.

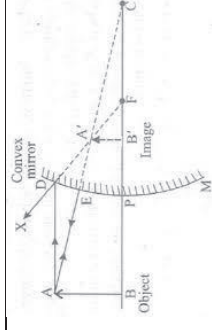
Let's check concept of Reflection of sound once more:

- ✓ Draw the ray diagrams of Convex mirror?
- ✓ What are the applications of Convex mirror in our daily life?
- ✓ In which cases Convex mirror forms Virtual image?
- ✓ By the property of reflection of light we compare concave mirror and convex mirror.
- ✓ Convex mirror always forms Virtual image.
- ✓ In Next class we will learn about Sign convention for reflection of spherical mirrors. Let's watch a video ON IFP.
- ✓ Let's watch a video ON IFP.
- ✓ <https://youtu.be/F08E4AUuY20>

placed in between pole and focus of the Convex mirror?

- ✓ Why the Convex mirrors are used as rear view mirrors?
- ✓ If the image formed by a mirror for all positions of the object placed in front of it is always virtual and diminished, then state the type of the mirror?

- ✓ Q.In torches, search lights and headlights of vehicles the bulb is placed
(a) between the pole and the focus of the reflector
(b) very near to the focus of the reflector
(c) between the focus and centre of curvature of the reflector
(d) at the centre of curvature of the reflector



Teacher reflections & Experiences:

1. Was the pacing of the lesson appropriate?
2. Did I cover all the planned content without rushing or leaving gaps?
3. How can I better manage the time allocated for each activity?
4. What were my strengths during the lesson?

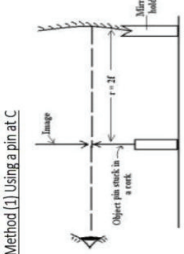
PERIOD PLAN - 5

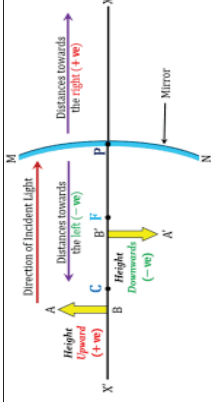
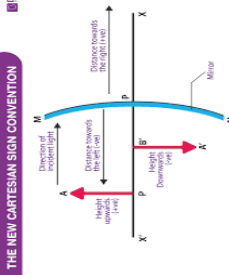

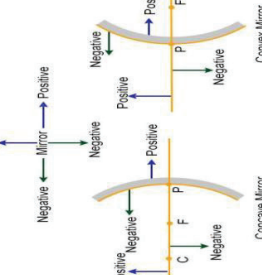
Class : X

Chapter : Light-Reflection and Refraction

Total periods : 12 **PERIOD** : 5

Key Concepts : Sign Convention for Reflection by spherical mirrors, Mirror Formula and Magnification

Learning Outcomes	Teaching Learning Process	Pointers for Assessment	Material required
<p>Describes scientific discoveries/ inventions, such as discovery of various concepts under Sign convention for Reflection by Spherical mirrors.</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ Identify the object distance? How can you denote it? ✓ Identify the image distance? How can you denote it? <p>Teacher's activity:</p>	<p>(previous questions)</p> <ul style="list-style-type: none"> ✓ Name the mirror used by dentist? 	<p>image on IFP</p> 

<p>Expresses u, v, f in the mirror formula in order to apply sign convention in solving word problems to find the unknown variable.</p> <p>Presents the role of Sign convention in case of spherical mirrors.</p> <p>Describes using poster, Sign convention in case of spherical mirrors.</p>	 <ul style="list-style-type: none"> ✓ The principal axis of the mirror is taken as the X-axis. ✓ All distances parallel to the principal axis are measured from the pole of the Mirror. ✓ All the distances measured to the right of the origin along the X-axis are taken as positive. ✓ All the distances measured to the left of the origin along the X-axis are taken as negative ✓ Distance measured perpendicular to and above the principal axis along Y-axis are taken as positive. ✓ Distance measured perpendicular to and below the principal axis along Y-axis are taken as negative. ✓ The distance of the object from the pole of the mirror is called the object distance(u). ✓ The distance of the image from the pole of the mirror is called the image distance(v). ✓ The distance between the principal focus and the pole of the mirror is 	<ul style="list-style-type: none"> ✓ From where do you measure distances for spherical mirrors? ✓ Which quantities are taken as positive for a convex mirror? ✓ Which quantities are taken as negative for a convex mirror? ✓ Which quantities are taken as positive for a concave mirror? ✓ Which quantities are taken as negative for a concave mirror? ✓ Express sign convention for virtual and real images? 	<p>THE NEW CARTESIAN SIGN CONVENTION</p>   
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called Focal length(f).

	Concave mirror	Convex mirr
Real image	$u \rightarrow -$ $v \rightarrow -$ $f \rightarrow -$ $h_o \rightarrow +$ $h_i \rightarrow -$ $R \rightarrow -$ $m \rightarrow -$	Virtual image $u \rightarrow -$ $v \rightarrow +$ $f \rightarrow -$ $h_o \rightarrow +$ $h_i \rightarrow +$ $R \rightarrow -$ $m \rightarrow +$
Distance of object	$u \rightarrow -$	$u \rightarrow -$
Distance of image	$v \rightarrow -$	$v \rightarrow +$
Focal length	$f \rightarrow -$	$f \rightarrow +$
Height of object	$h_o \rightarrow +$	$h_o \rightarrow +$
Height of image	$h_i \rightarrow -$	$h_i \rightarrow +$
Radius of curvature	$R \rightarrow -$	$R \rightarrow +$
Magnification	$m \rightarrow -$	$m \rightarrow +$

Let us discuss about Mirror formula and Magnification produced by the spherical mirrors.

✓ The mirror formula is given by

$$\checkmark \frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

✓ This formula is valid in all situations for all spherical mirrors for all positions of the object.

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

Mirror Equation

✓ Let's watch this video on IFP .

✓ Let us discuss about Magnification produced by the spherical mirror.

✓ The ratio of the height of the image

✓ State the sign convention rule in spherical mirrors?

✓ Express sign convention for Real image?

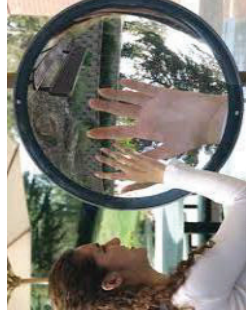
✓ Relate the physical quantities u, v and f to obtain Mirror formula?

✓ In which situations the Mirror formula is valid?

✓ What is the relation between Angle of Incidence and Angle of Reflection?

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

https://youtu.be/ADyTxB2g_Iw



$$m = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$$

to the height of the object is called Magnification.

Linear Magnification, m

$$m = \frac{\text{height of image } h'}{\text{height of object } h}$$

or

$$m = - \frac{\text{image distance } v}{\text{object distance } u}$$

$$m = \frac{h'}{h} = - \frac{v}{u} \quad \text{or} \quad m = \frac{v}{u}$$

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Let's check concept of Sign convention for Reflection by spherical mirrors, Mirror formula and Magnification:

- ✓ Mention the rules for sign convention for spherical mirrors?
- ✓ Express Mirror formula for spherical mirrors?
- ✓ Express Magnification in terms of distance also in height?
- ✓ Sign convention rules to be followed for spherical mirrors.
- ✓ By using Mirror formula we can determine focal length of a mirror.
- ✓ .Magnification can be expressed in terms of height and distance.
- ✓ In Next class we will learn more about Refraction of light and Refractive Index .



<https://www.youtube.com/watch?v=hvjDHxvMS>
CY



- ✓ How do you express magnification of mirror in terms of Height?
- ✓ How do you express magnification of mirror in terms of distance?
- ✓ Which mirror can form magnified image?
- ✓ For virtual image what is the sign for Magnification?
- ✓ For real image what is the sign for Magnification?
- ✓ Which mirror can form diminished image?

Teacher reflections & Experiences:

1. Was the pacing of the lesson appropriate?


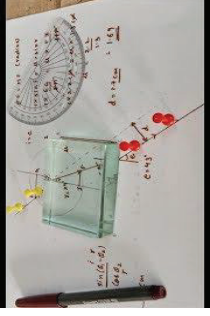
2. Did I cover all the planned content without rushing or leaving gaps?

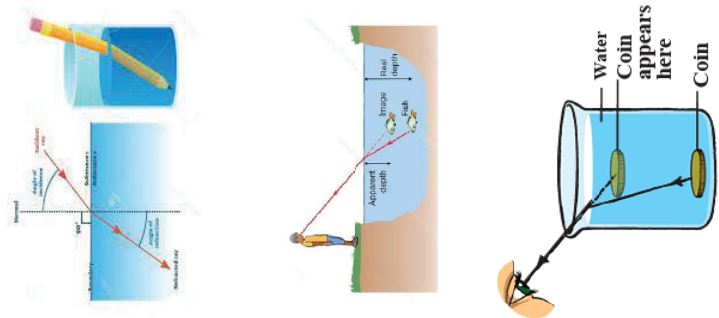
3. How can I better manage the time allocated for each activity?

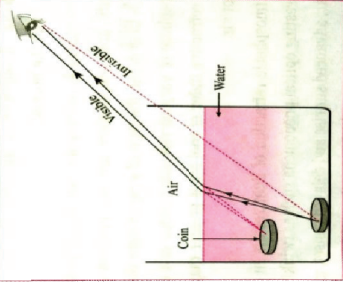
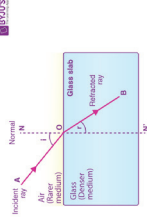
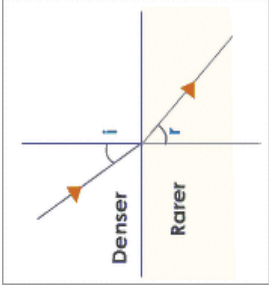
4. What were my strengths during the lesson?

PERIOD PLAN - 6

Class : X
 Chapter : Light-Reflection and Refraction
 Total periods : 12 PERIOD : 6
 Key Concepts : Refraction of Light and Refractive Index

Learning Outcomes	Teaching Learning Process	Pointers for Assessment (previous questions)	Material required
<p>Describes scientific discoveries/ inventions, such as discovery of various concepts under Refraction of light.</p> <p>Compares speed of light in one medium with another in order to calculate refractive index.</p> <p>Presents the role of Refraction of light Daily life.</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ How the bottom of a bucket appears after pouring water? (bottom appears to be raised) ✓ How the lemon kept in water in a glass tumbler appears? (student's response: It appears bigger) <p>Teacher's activity:</p> <ul style="list-style-type: none"> ✓ When thick glass slab is placed over some printed matter then the letters appears to be raised when viewed through glass slab. ✓ Have you seen a pencil partly immersed in water in a glass tumbler? How will be the pencil? ✓ The light reaching us from the portion of the pencil inside water 	<p>knowledge</p> <ul style="list-style-type: none"> ✓ How the bottom of a tank appears when it is filled with water? ✓ When glass slab is placed over printed matter how they appears? ✓ Why a pencil kept in a glass tumbler filled with water seen from the side of the glass seems bent? ✓ How the bottom of a pond containing water appears? 	<p>image on IF</p>  

<p>Describes using poster, the Refraction of light.</p> <p>Student gives applications of refraction of light .</p>	<p>seems to come from a different direction which is due to the phenomenon of Refraction of light.</p> <p>✓ Activity: Place a coin at the bottom of a bucket fill with water. With your eye to a side above water, try pick up the coin in one go.</p> <p>✓ Activity : Place a large shallow bowl on a table and put a coin in it. Move away slowly from bowl and stop when the coin just disappears from your sight. Now pour some water gently into the bowl at one stage the coin re-appears.</p> <p>✓ From these activities we can say that bending of light ray taking place.</p> <p>✓ This bending of light ray when it travels from one medium to another medium is called Refraction of light.</p> <p>Let's watch this picture on IFP and give response.</p> <p>Let us discuss about the concept Refractive Index. (15 min)</p> <p>✓ Light travels fastest in vacuum with a speed of 3×10^8 m/s.</p> <p>✓ The speed of light is higher in rarer medium than a denser medium.</p> <p>✓ The bending of light ray takes place</p>	<p>✓ Can you pick the coin in one go?</p> <p>✓ Why you can't pick the coin in one go?</p> <p>✓ Which image of the coin you will observe in water?</p> <p>✓ Why the coin re-appears in the activity?</p> <p>✓ Why does the coin at bottom of the vessel appear to be raised in the figure?</p> <p>✓ In which medium light travels with maximum velocity?</p> <p>✓ Can you give some examples for rarer media?</p> <p>✓ Can you give some examples for denser media?</p> <p>✓ What is the reason for Refraction of light?</p> <p>✓ Why the light ray bends when it travels from one</p>	<p>REFRACTION</p> 
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<p>Student compares rarer media and denser media..</p> <p>Student predicts what will happen when the coin is immersed in water.</p> <p>Student describes the Snell's law.</p>	<p>when it travels from one medium to another medium.</p> <ul style="list-style-type: none"> ✓ The light ray bends towards the normal when it travels from rarer to denser medium. ✓ The light ray bends away from the normal when it travels from rarer to denser medium. <div style="border: 1px solid black; padding: 5px; text-align: center;"> $n = \frac{\text{Speed of light in vacuum (or air)}}{\text{Speed of light in the medium}}$ </div> <ul style="list-style-type: none"> ✓ So the Refractive Index is given by $n = c/v$. <p>Let's watch a video ON IFP. Regarding Refraction of Light and Refractive Index.</p> <p>Let's check concept of Refraction of light once more: (5min)</p> <ul style="list-style-type: none"> ✓ What are the applications of Refraction of light? ✓ Write the formula for Refractive 	<p>medium to another medium?</p> <ul style="list-style-type: none"> ✓ In which medium travels fastest? ✓ Which factors decide the speed of light in a medium? ✓ On which factors does the refractive index of a medium depend? ✓ What is the use of Refractive index of a medium? ✓ Write the name of the material for which the value of Refractive Index is (i) Minimum and (ii) Maximum? ✓ What are the units of Refractive Index? 	 <p>Fig. 6.25 : The coin becomes visible when water is poured in the bowl (schematic diagram)</p>  
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Index of a medium?

- ✓ In Next class we will learn more about Refraction through glass slab.



$$n = \frac{\text{Speed of light in vacuum (or air)}}{\text{Speed of light in the medium}}$$

Refractive medium	Refractive index	Refractive medium	Refractive index
Air	1.0003	Crystals	1.53
Ice	1.31	Rubium	1.54
Water	1.33	Rock salt	1.54
Alcohol	1.36	Carbon	1.63
Benzene	1.44	Disulphide	1.65
Fused quartz	1.46	Dense flint glass	1.65
Turpentine oil	1.47	Ruby	1.71
Benzene	1.50	Sapphires	1.77
Quartz glass	1.52	Diamond	2.42



https://www.youtube.com/watch?v=tAgwqdO6Uyc&list=PLf0dYueVuaiaHZn_WRf1PJrZiJlpcVmws&index=3

Teacher reflections & Experiences:

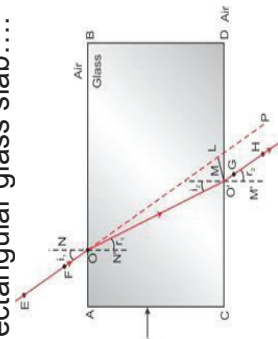
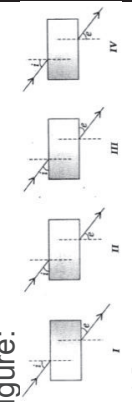
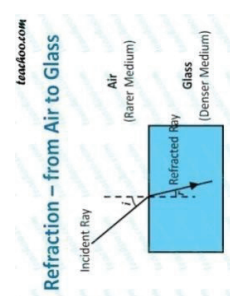
1. In what areas can I improve as a teacher?
2. How can I continue to develop my teaching skills and practices?
3. Did I encourage self-reflection and meta cognition among students?
4. How can I incorporate more opportunities for students to reflect on their learning and assess their own progress?

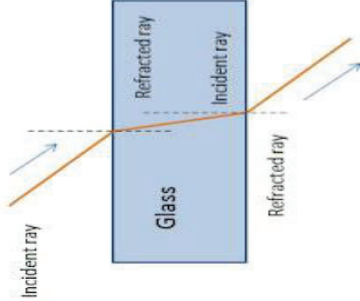
PERIOD PLAN - 7

Class : X
 Chapter : Light-Reflection and Refraction
 Total periods : 12
 Key Concepts : Refraction through a Rectangular Glass Slab

PERIOD : 7

Key Concepts : Refraction through a Rectangular Glass Slab

Learning Outcomes	Teaching Learning Process	Pointers for Assessment	Material required
<p>Describes scientific discoveries/ inventions, such as discovery of various concepts under Refraction of light through glass slab.</p> <p>Demonstrates the path of light when it travels through a rectangular glass slab, in order to formulate laws of refraction of light.</p> <p>Presents the demonstration method to present Refraction of light Through rectangular glass slab.</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ When glass slab is placed over printed matter how they appears? ✓ Why the light ray bends when it travels from one medium to another medium? <p>Teacher's activity:</p> <p>To understand the Refraction of light through rectangular glass slab....</p> 	<p>(previous knowledge)</p> <ul style="list-style-type: none"> ✓ When light ray travels from air glass slab in which direction it bends? <p>Q.A student does the experiment on tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence. He can get a correct measure of the angle of incidence and the angle of emergence by following the labeling indicated in figure:</p>  <p>a) I (b) II</p>	<p>image on IFP</p> 

<p>Describes using poster, the refraction of light through glass slab.</p>	<ul style="list-style-type: none"> ✓ Fix a sheet of white paper on a drawing board using drawing pins. ✓ Place a rectangular glass slab over the sheet in the middle. ✓ Draw the outline of the slab with pencil . Let us name the outline as ABCD. ✓ Take four identical pins. ✓ Fix two pins, say E and F, virtually such that the line joining the pins is inclined to the edge AB. ✓ Look for the images of the pins E and F through the opposite edge. ✓ Fix two other pins, say G and H, such that these pins and the image of E and F lie on a straight line. ✓ Remove the pins and the slab. ✓ Join the positions of tip of the pins E and F and produce the line up to AB. ✓ Let EF and meet AB at O. ✓ Similarly, join the positions of tip of the pins G and H and produce it up to the edge CD. ✓ Let HG meet CD at O¹. ✓ Join O and O¹. Also produce EF up to P as shown by a dotted line. ✓ Let's watch this picture on IFP and give response. 	<p>(c) III (d) IV</p> <ul style="list-style-type: none"> ✓ What is angle of deviation produced in Incident ray and emergent ray? ✓ What happens when a light ray is incident normally to the interface of two media? 	 
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Let us discuss about Laws of Refraction of Light.

- ✓ (i) The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.
- ✓ (ii) The ratio of Sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media.
- ✓ Let's watch a video ON IFP by using given link.
- ✓

Let's check concept of Refraction through a Rectangular Glass slab: (5min)

- ✓ Draw the Refraction of light through a Glass slab with a neat Ray diagram?
- ✓ Write Snell's law and explain the terms in it?
- ✓ Refraction is due to change in speed of light as it enters from one transparent medium to another..
- ✓ The phenomenon of Refraction of light through glass slab was verified.
- ✓ The ratio Sine of angle of incidence to the Sine of angle of refraction is a constant and is equal to refractive index.

Angle of Refraction?


- ✓ Mention the materials required to do experiment of Refraction of light through a Rectangular Glass slab?

Q: A ray of light in air is incident on an air-to-glass boundary at an angle of 30. degrees with the normal. If the index of refraction of the glass is 1.65, what is the angle of the refracted ray within the glass with respect to the normal?

- | | | | |
|---------------|---------------|----------------|---------------|
| a. 56 degrees | b. 46 degrees | c. 30. degrees | d. 18 degrees |
|---------------|---------------|----------------|---------------|

Q Which of the following describes what will happen to a light ray incident on an air-to-glass boundary?

- | | |
|---|---|
| a. total reflection | b. total transmission |
| c. partial reflection, partial transmission | d. partial reflection, total transmission |




$$\frac{\sin i}{\sin r} = n = \text{Constant}$$

<https://byjus.com/physics/tracing-path-of-a-ray-of-light-passing-through-a-glass-slab/>

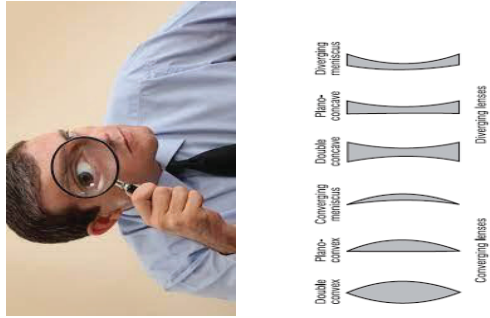


https://www.youtube.com/watch?v=1Zes_RGP5I

	✓ In Next class we will learn more about Refraction of spherical Lenses.		
<p>Teacher reflections & Experiences:</p> <ol style="list-style-type: none">1. Did I critically examine student work to gain insights into their understanding and identify areas for improvement?2. How can I use student work as a valuable source of information for my teaching?3. Did I effectively utilize formative assessments to monitor student progress and adjust instruction accordingly?4. How can I further integrate assessment for learning strategies into my teaching practice?			

PERIOD PLAN - 8

Class : X
Chapter : Light-Reflection and Refraction
Total periods : 12
PERIOD - 8
Key Concepts : Refraction by Spherical Lenses

Learning Outcomes	Teaching Learning Process	Pointers for Assessment	Material required
<p>Describes scientific discoveries/ inventions, such as discovery of various concepts under Spherical Lenses.</p> <p style="color: red;">Represents the path of incident and reflected light rays from a lens, in order to decipher the position nature of image formed.</p> <p>Presents the role of Refraction of light Understanding the properties of spherical lenses.</p>	<p style="color: #00A0C9;">Introductory activity:</p> <ul style="list-style-type: none"> ✓ What happens when a light ray enters into the glass slab? ✓ Why the light ray under go refraction? <p style="color: #00A0C9;">Teacher's activity:</p> <ul style="list-style-type: none"> ✓ What will you use to see the small objects? ✓ Have you ever touch the surface of a magnifying glass with your hand? ✓ Is it plane surface or curved? 		<p>image on IFP</p> 

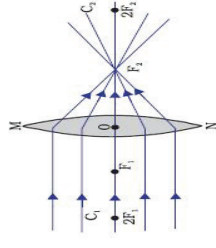
Describes using poster, the Refraction of light in spherical Lenses.

- ✓ Is it thicker at the middle or at the edges?
- ✓ How are the two spherical surfaces? Are the bulges or plane?
- ✓ A transparent material bounded by two surfaces, of which one or both the surfaces are spherical is called a Lens.
- ✓ In above case the Lens is having bulging outward.
- ✓ The Lens having two spherical surfaces bulging outward is called double Convex lens.
- ✓ The Lens having two spherical surfaces bulging inwards is called double Concave lens.

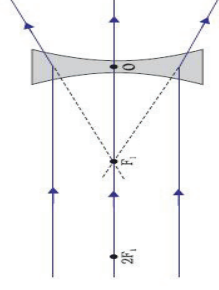
Let's watch this picture on IFP and give response.

Activity. (15 min)

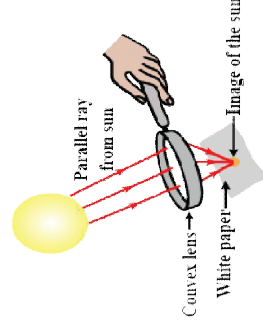
- ✓ Hold a Convex lens in your hand.
- ✓ Direct it towards Sun.
- ✓ Focus the light from sun on a sheet of paper.
- ✓ Obtain a sharp bright image of Sun.
- ✓ Hold the paper and lens in the same position for a while.
- ✓ The paper begins to burn producing smoke.



(a) Converging action of convex lens



(b) Diverging action of concave lens



- ✓ Here the concentration of the sunlight at a point generated heat.
- ✓ From above activity we can say that the parallel beam of light falling on a Convex lens converging to a point on the principal axis.
- ✓ This point on the principal axis is called principal focus.
- ✓ Hence the distance between the position of the lens and the position of the image is called Focal length of the Lens.
- ✓ A number of rays parallel to the principal axis falling on a Concave lens are appears to be diverging from a point is called principal focus(F).
- ✓ The distance between the pole and the principal focus is called Focal length(f).

Let's check concept of Spherical mirrors once more:

- ✓ What are the types of lenses?
- ✓ Which lens acts as Converging Lens?
- ✓ Which lens acts as diverging lens?
- ✓ Convex lens will have bulging outward where as concave lens bulging inwards.

Q. We put glass piece on a printed page; image of prints on the page has same size when viewed from glass piece. The piece is:

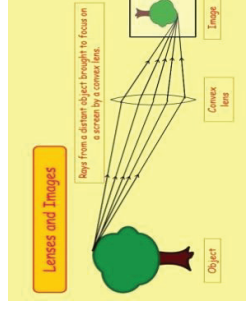
1. Convex lens
2. Glass slab
3. Concave lens
4. Prism


Q. Which of the following is diverging in nature ?

1. Plane mirror
2. Convex lens
3. Concave lens
4. None of these

Q. If a convex lens is thin its focal length is:


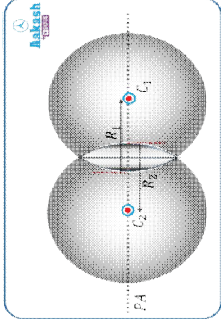
1. Small
2. Large
3. Nothing can be said



	<ul style="list-style-type: none">✓ Refraction of light plays important role in the forming images by lenses.✓ In Next class we will learn more about Image formation in Convex Lens using Ray diagrams .	<p>4. None of these</p>	<p>https://youtu.be/dNYRfG7wSDg</p> 
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PERIOD PLAN - 9

Class : X
Chapter : Light-Reflection and Refraction
Total periods : 12 **PERIOD - 9**
Key Concepts : Image formation by Lenses-Convex Lens

Learning Outcomes	Teaching Learning Process	Pointers for Assessment	Material required
<p>Describes scientific discoveries/ inventions, such as discovery of various concepts under Reflection of Sound.</p> <p>Illustrates the path of incident and reflected light rays from a convex lens, in order to decipher the position and nature of image formed.</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ Which lens is thick at the middle and thin at the edges? ✓ Which lens is called converging lens? <p>Teacher's activity:</p> <ul style="list-style-type: none"> ✓ Let us discuss about Ray diagrams of Convex Lens. 		<p>image on IFP</p> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div>

Presents the role of Refraction of light. To draw the ray diagrams of Convex Lens.

Describes uses of lenses.

Student analyses the phenomena Involved in working of spherical lenses.

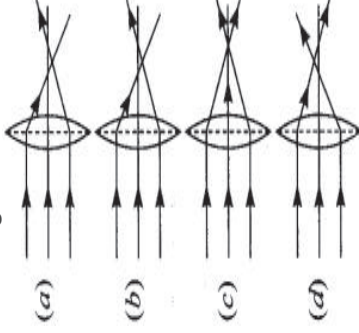
✓ When the object is at infinity then Convex lens forms highly diminished point sized, real and inverted image is at its focus F_2 .

✓ When the object is placed beyond $2F_1$ (Centre of curvature) then diminished real and inverted image is formed in between F_2 and $2F_2$.

✓ When the object is placed at (Centre of Curvature) $2F_1$ then Real, Inverted image of same size is formed on $2F_2$ Centre of curvature again.

✓ When the object is placed between $2F_1$ (Centre of Curvature) and Focus then enlarged, real and inverted image is formed beyond $2F_2$.

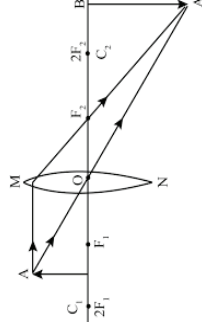
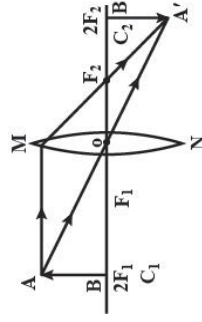
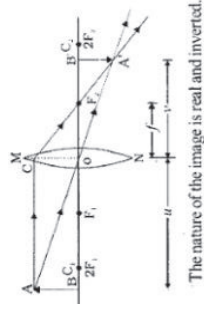
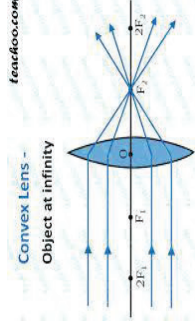
Q. The distance between the optical centre and point of convergence is called focal length in which of the following cases?



.An object is placed at a distance of 30.0 cm from a thin converging lens along its axis. The lens has a focal length of 10.0 cm. What are the values of the image distance and magnification (respectively)?

a. 60.0 cm and 2.00	b. 15.0 cm and 2.00	c. 60.0 cm and -0.500	d. 15.0 cm and -0.500
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Q. Which of the following ray diagrams is correct for the ray



- ✓ When the object is placed at Focus F_1 then highly enlarged, real and inverted image is formed at infinity.

- ✓ When the object is placed between Focus F_1 and optic centre then enlarged, virtual and erect image is formed on the same side of the Lens.

Let's watch a video ON IFP.

Let us discuss about applications of Concave mirror. (15 min)

Convex Lens is used as

- ✓ Magnifier
- ✓ Bi-Convex lens is used to correct Myopia .

Let's check concept of Image formation of spherical mirrors.:

- ✓ Draw the Ray diagrams of Convex lens?
- ✓ Today we learn about Ray diagrams of Convex Lens.

of light incident on a lens shown in Fig. 10.7?

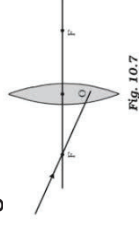
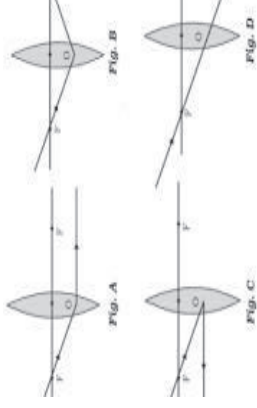


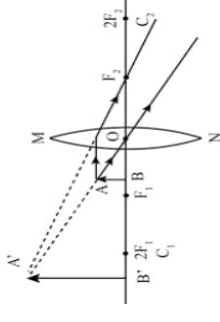
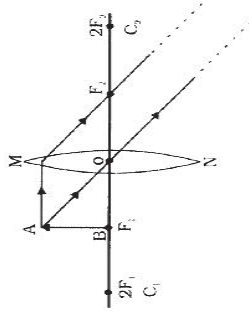
Fig. 10.7



A) a B) b C) c D) d

Q. Which of the following best describes the image for a thin converging lens that forms whenever the object is at a distance less than one focal length from the lens?

a. inverted, enlarged and real	b. upright, enlarged and virtual
c. upright, reduced and virtual	d. inverted, reduced and real



<https://www.youtube.com/watch?v=qxcBAf7YVV>

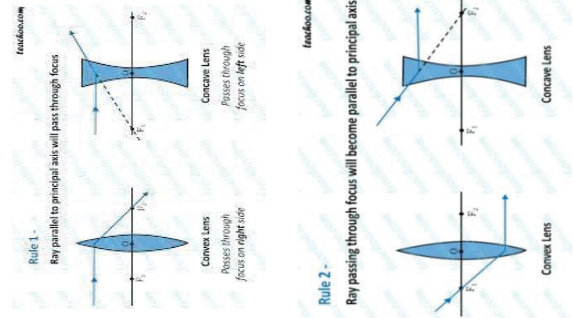
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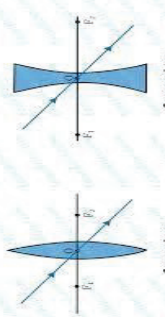
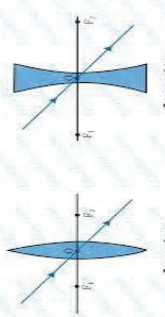

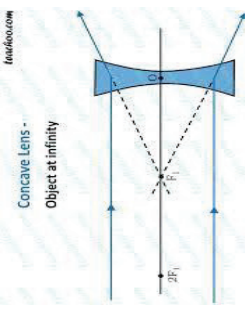
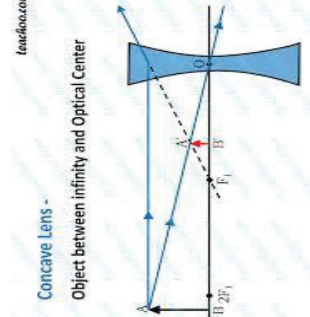


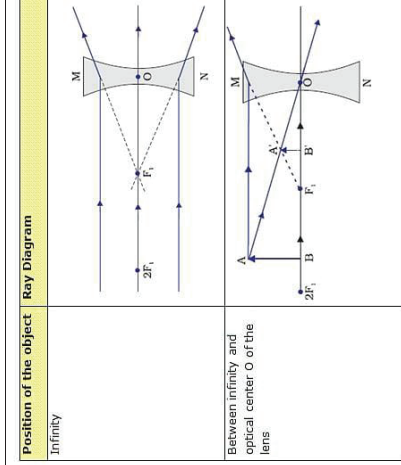
		<p>Q. The branch of optics that focuses on the creation of images is called</p> <ul style="list-style-type: none">A) geometric lensesB) retinal branchC) geometrical opticsD) fiber optics	
<p>Teacher reflections & Experiences:</p> <ol style="list-style-type: none">1. How well did I manage the classroom during the lesson?2. Were there any disruptions or behavioral issues that I need to address?3. What strategies can I implement to improve classroom management?4. Did the students actively participate and show interest in the lesson?			

PERIOD PLAN - 10

Class : X
Chapter : Light-Reflection and Refraction
Total periods : 12 **PERIOD - 10**
Key Concepts : Image Formation in Lenses –Ray diagrams of Concave Lens

Learning Outcomes	Teaching Learning Process	Pointers for Assessment	Material required
<p>Describes scientific discoveries/ inventions, such as discovery of various concepts under Spherical Lenses.</p> <p>Illustrates the path of incident and refracted light rays from a convex lens, in order to decipher the position and nature of image formed.</p> <p>Presents the role of Refraction of light Understanding the properties of spherical</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ Which lens is thick at the middle and thin at the edges? ✓ Which lens is called converging lens? <p>Teacher’s activity:</p> <p>We can represent image formation by lenses using ray diagrams.</p> <ul style="list-style-type: none"> ✓ A ray of light from the object, parallel to the principal axis, after refraction from a convex lens, passes through the principal focus on the other side of the lens. 		<p>image on IFP</p>  <p>The diagrams illustrate the following rules:</p> <ul style="list-style-type: none"> Rule 1 - Convex Lens: A ray parallel to the principal axis will pass through the focus on the right side. Rule 1 - Concave Lens: A ray parallel to the principal axis will pass through the focus on the left side. Rule 2 - Convex Lens: A ray passing through the focus on the left side will become parallel to the principal axis on the right side. Rule 2 - Concave Lens: A ray passing through the focus on the right side will become parallel to the principal axis on the left side.

<p>lenses.</p> <p>Describes using poster, the Refraction of light in spherical lenses.</p> <p>Compares Convex and Concave Lenses.</p> <p>Draws the ray diagrams for Concave lens.</p>	<ul style="list-style-type: none"> ✓ In case of concave lens, the rays appear to diverge from the principal focus located on the same side of the lens. ✓ A ray of light passing through a principal focus, after refraction from convex lens, will emerge parallel to the principal axis. ✓ A ray of light appearing to meet at the principal focus of a concave lens, after refraction, will emerge parallel to the principal axis. ✓ A ray of light passing through the optical centre of a lens will emerge without any deviation. <p>Let's watch this picture on IFP and give response.</p> <p>Now we will discuss about the ray diagram for the image formation in a concave lens.</p>	<p>Q. According to sign convention, the focal length of concave lens is</p> <p>a) positive b) negative c) zero d) one</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Rule 3 - Ray passing through Optical Center will emerge without deviation.</p> <p>Convex Lens</p> </div> <div style="text-align: center;">  <p>Concave Lens</p> </div> </div> <div style="text-align: center; margin-top: 10px;">  <p>Convex Lens Concave Lens</p> </div> <div style="text-align: center; margin-top: 10px;">  <p>Concave Lens - Object at infinity</p> </div> <div style="text-align: center; margin-top: 10px;">  <p>Concave Lens - Object between infinity and Optical Center</p> </div>
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- ✓ When the object is at infinity then Concave lens forms highly diminished point sized, virtual and erect image is at its focus F_1 .
- ✓ When the object is placed in between infinity and optical centre O of the Concave Lens then diminished, virtual and erect image is formed in between Focus F_1 and optical centre O.

Let's check concept of Spherical mirrors once more: (5min)

Q. Magnifying power of a concave lens is
 (a) always > 1
 (b) always < 1
 (c) always $= 1$
 (d) can have any value

Q. A concave lens forms a virtual and erect image of an object placed 12 cm in front of it. If the focal length of the lens is -8 cm, what is the magnification of the lens?

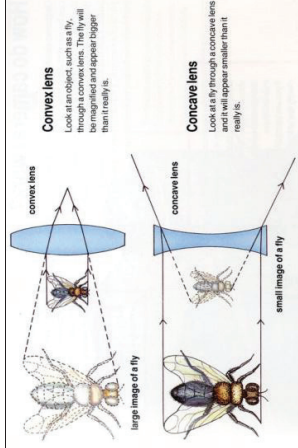
- (a) 0.67
- (b) 1.5
- (c) -0.67
- (d) -1.5

Q. When an object is placed in front of a concave lens, the image formed is:

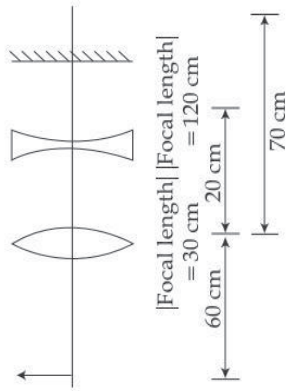
- (a) Real, inverted, and enlarged
- (b) Real, inverted, and reduced
- (c) Virtual, erect, and enlarged
- (d) Virtual, erect, and reduced

https://youtu.be/sXx_ij8H7-k





Q. A convex lens, of focal length 30 cm, a concave lens of focal length 120 cm, and a plane mirror are arranged as shown. For an object kept at a distance of 60 cm from the convex lens, the final image, formed by the combination, is a real image, at a distance of :



- A. 60 cm from the convex lens
- B. 60 cm from the concave lens
- C. 70 cm from the convex lens
- D. 70 cm from the concave lens

- ✓ Write down the differences between Convex Lens and Concave Lens?
- ✓ There are two types of Mirrors.
- ✓ In Next class we will learn more about Sign convention for spherical lens, Lens formula and Magnification.

Teacher reflections & Experiences:

1. How can I increase student engagement and create a more interactive learning Environment ?

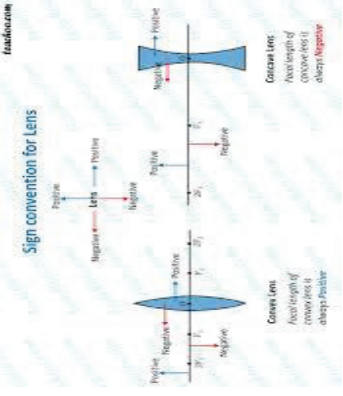
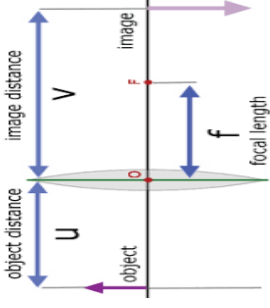
2. Did I assess student understanding effectively during the lesson?

3. Did I provide timely and constructive feedback to guide their learning?

4. How can I improve my assessment and feedback practices?

PERIOD PLAN - 11

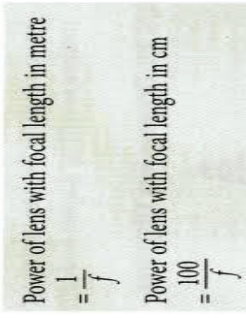
Class : X
Chapter : Light-Reflection and Refraction
Total periods : 12
PERIOD - 11
Key Concepts : Sign Convention for spherical Lenses, Lens Formula, Magnification and Power of a Lens.

Learning Outcomes	Teaching Learning Process	Pointers for Assessment	Material required
<p>Describes scientific discoveries/inventions, such as discovery of various concepts under Sign convention for Refraction by Spherical lenses.</p> <p>Constructs the Lens formula for a lens relating u, v, f in order to find an unknown variable given other two.</p> <p>Presents the role of Sign convention in case of spherical lenses.</p>	<p>Introductory activity:</p> <ul style="list-style-type: none"> ✓ Identify the object distance? How can you denote it? ✓ Identify the image distance? How can you denote it? <p>Teacher's activity:</p> 		<p>image on IFP</p> 

✓ For lenses, we follow sign convention

<p>Describes using poster, Sign convention in case of spherical lenses.</p> <p>Student analyses the concept of sign convention in case of lenses.</p>	<p>convention similar to the one used for spherical mirrors.</p> <ul style="list-style-type: none"> ✓ The focal length of a convex lens is positive and that of a concave lens is negative. ✓ Focal length of Convex lens is taken as positive. ✓ Focal length of Concave lens is taken as negative. ✓ Since object is always in front of the lens, the object distance always negative. ✓ If a real image is formed on right side, so image distance is positive. ✓ If a virtual image is formed, image is formed on left side, so image distance is negative. ✓ Since object is always above the principal axis, object height will be positive. ✓ If image is above the principal axis, image height will be positive. It means that image is erect. ✓ If image is below the principal axis, image height will be negative. It means that image is inverted. 	
<p>Let us discuss about Lens formula, Magnification and power of a Lens.</p>		

<p>Relates Object distance, Image distance and Focal length of a Lens.</p>	<ul style="list-style-type: none"> ✓ The distance of the principal focus from the optical centre of a lens is called Focal length(f). ✓ The distance of the object from the optical centre of the lens is called the object distance(u). ✓ The distance of the image from the optical centre is called the image distance(v). ✓ The Lens formula is given by $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ ✓ The ratio of the height of the image and the height of the object is called Magnification. $m = h^1/h = v / u$ ✓ The ability of a lens to converge or diverge light rays depends on its focal length. ✓ A convex lens of short focal length bends the light through a large angles. ✓ A concave lens of very short focal length causes higher divergence than the one with longer focal length. ✓ The reciprocal of focal length is called power of lens. 	<p>Q.If the magnification is positive and greater than unity, what does it indicate?</p> <p>a) Virtual image b) Real image c) Distorted image d) Erect image</p> <p>Q.Microscope is an optical instrument which</p> <p>A) Enlarges the object B) Increases the visual angle formed by the object at the eye C) Decreases the visual angle</p>	<p style="text-align: center;">Lens Sign Convention Table</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Quantity</th> <th style="width: 30%;">Condition</th> <th style="width: 40%;">Sign</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Focal Length, f</td> <td>Convex Lens</td> <td>Positive (+)</td> </tr> <tr> <td>Concave Lens</td> <td>Negative (-)</td> </tr> <tr> <td>Object Distance</td> <td>Always</td> <td>Negative (-)</td> </tr> <tr> <td rowspan="2">Image Distance</td> <td>Image Real</td> <td>Positive (+)</td> </tr> <tr> <td>Image Virtual</td> <td>Negative (-)</td> </tr> <tr> <td rowspan="2">Magnification</td> <td>Image Upright</td> <td>Positive (+)</td> </tr> <tr> <td>Image Uprturn</td> <td>Negative (-)</td> </tr> </tbody> </table> $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$	Quantity	Condition	Sign	Focal Length, f	Convex Lens	Positive (+)	Concave Lens	Negative (-)	Object Distance	Always	Negative (-)	Image Distance	Image Real	Positive (+)	Image Virtual	Negative (-)	Magnification	Image Upright	Positive (+)	Image Uprturn	Negative (-)
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	Image Uprturn	Negative (-)																						

	<p>✓ Let's watch a video ON IFP.</p> <p>$P = \frac{1}{f}$</p> <p>Let's check concept of Sign convention for Refraction by spherical lenses, Lens formula and Magnification:</p> <p>✓ Mention the rules for sign convention for spherical mirrors?</p> <p>✓ Express Mirror formula for spherical mirrors?</p> <p>✓ Express Magnification in terms of distance also in height?</p> <p>✓ Sign convention rules to be followed for spherical lenses.</p> <p>✓ By using Lens formula we can determine focal length of a Lens.</p> <p>✓ .Magnification can be expressed in terms of height and distance.</p> <p>✓ Power of a lens is measured in terms of Focal length.</p> <p>✓ In Next class you have to answer</p>	<p>formed by the object at the eye</p> <p>D) Brings the object nearer</p> <p>Q. To produce magnified erect image of a far object, we will be required along with a convex lens, is</p> <p>A) Another convex lens B) Concave lens C) A plane mirror D) A concave mirror</p> <p>Q. What is the SI unit for the power of the lens? a) Watt b) Dioptre c) Meter d) Centimeter</p> <p>Q. If a convex lens of focal length 80 cm and a concave lens of focal length 50 cm are combined together, what will be their resulting power?</p>	<p>LENS FORMULA AND MAGNIFICATION</p> <p>Lens Formula is $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$</p> <p>Magnification:</p> <p>Height of the image = $\frac{h'}{h}$ Height of the object = $\frac{h}{h}$</p> <p>Also, $m = \frac{h'}{h} = \frac{v}{u}$</p> <p>Where u = object distance v = image distance</p> <p>Linear Magnification, m</p> $m = \frac{\text{height of image } h'}{\text{height of object } h}$  <p>Power of lens with focal length in metre = $\frac{1}{f}$</p> <p>Power of lens with focal length in cm = $\frac{100}{f}$</p>
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work sheet .

- (a) + 6.5 D
- (b) - 6.5 D
- (c) + 7.5 D
- (d) - 0.75 D



Power of a Lens

Power of a lens is reciprocal of its focal length

$$P = \frac{1}{\text{Focal Length}}$$


The SI unit of power is **diopetre (D)**.

1 diopetre is the power of a lens whose focal length is 1 meter

Also,

- Power of a convex lens is positive
- Power of a concave lens is negative

<https://youtu.be/KkNjivO>
SpTW

			
<p>Teacher reflections & Experiences:</p> <ol style="list-style-type: none">1. Was the pacing of the lesson appropriate?2. Did I cover all the planned content without rushing or leaving gaps?3. How can I better manage the time allocated for each activity?4. What were my strengths during the lesson?			

Work Sheet - 1

Class : X
Chapter : Light-Reflection and Refraction of Light.
Total periods : 12 PERIOD -12
Key Concepts : Worksheet

ANSWER THE FOLLOWING QUESTIONS

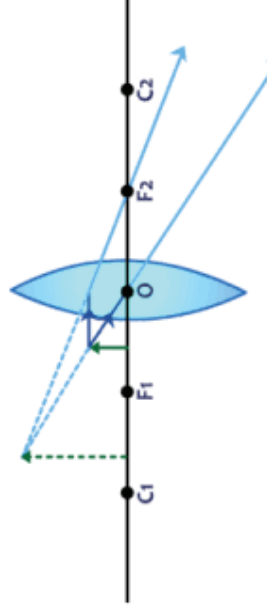
TOTAL MARKS:15M

1. Write the relationship among the object distance (u), image distance (v) and focal length(f) of spherical lens and spherical mirror? **2M**
2. Draw ray diagram for the following cases when a ray of light passing through centre of curvature of a concave mirror is incident on it? **2M**
3. Rishi went to a palmist to show his palm. The palmist used a special lens for this purpose.
(i) State the nature of the lens and reason for its use? **2M**
(ii) Where should the palmist place/hold the lens so as to have a real and magnified image of an object? **2M**
4. The focal length of the lens is 25cm. Write the power of this Lens. **2M**
5. Kiran visited a dentist in his clinic. He observed that the dentist was holding an instrument. Fitted with a mirror. State the nature of this mirror and reason for its use in the instrument used by dentist. **2M**
6. Regarding Sign convention of a lens match the following **2M**

Quantity	Sign
(i) Focal length of a convex lens	() (a) Negative (-)
(ii) Object distance	() (b) Positive (+)

7. The diagram given below shows Object and Image

3M



State the following

- (i) Type of Lens in the above diagram?
- (ii) List the three characteristics of the image formed?
- (iii) Name the optical instrument where such an image is obtained?

Work Sheet - 2

CLASS: 09 & CHAPTER :10

LIGHT-REFLECTION AND REFRACTION

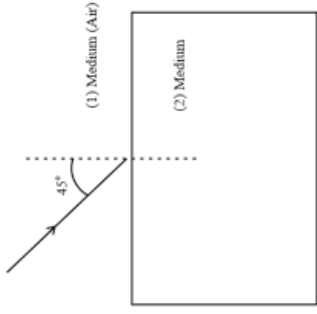
ANSWER THE FOLLOWING QUESTIONS

TOTAL MARKS:15M

1. How is a virtual image formed by a convex lens different from that formed by a concave lens Under what conditions do a convex and a concave lens form virtual images? 2M
2. A concave mirror of focal length 10 cm can produce a magnified real as well as virtual image of an object placed in front of it. Draw a ray diagram to justify this statement? 2M
3. A student observes that a coin appears to be raised when placed at the bottom of a beaker. Explain this observation using the concept of Refraction? 2M
4. A security mirror used in a big show room has radius of curvature 5cm. If a customer is standing at a distance of 20m from the cash counter, find the position, nature and size of the image formed in security mirror? 2M
5. A ray of light starting from diamond is incident on the interface separating diamond and water. Draw a labelled ray diagram to show the refraction of light in this case? 2M
6. Regarding Sign convention of a lens match the following 2M

Quantity	Sign
(i) Power of a concave lens	() (a) Positive (+)
(ii) Magnification of virtual image	() (b) Negative (-)

7. Draw and complete the following ray diagram on your answer sheet to show lateral displacement



2M

8. Draw a ray diagram to show the formation of image by a concave mirror when the object is placed in front of it between the centre of curvature and focus. What is the nature of the image formed?

9. If the focal length of the magnifying glass is 10cm and the lens is held at a distance of 5cm from the palm, use lens formula to find the position and size of the image?

2M

10. Define power of a lens? The focal length of a lens is -10cm. Write the nature of the lens and find its power?

2M

E-Content

https://youtu.be/zIV_33PkowY

<https://youtu.be/T5sspQR4TIs>

<https://youtu.be/QMEIx44Ikss>

https://youtu.be/9ASkbw_AKV8

<https://youtu.be/F08E4AUuY20>

https://www.youtube.com/watch?v=tAqwgdO6Uyc&list=PLf0dYueVuaiaHZn_WRf1PJrZiILpcVmwS&index=3

<https://byjus.com/physics/tracing-path-of-a-ray-of-light-passing-through-a-glass-slab/>

https://www.youtube.com/watch?v=-1Zes_RGP5I

<https://youtu.be/dNYRfG7wSDg>

<https://www.youtube.com/watch?v=qxcBAf7YYV4>

https://youtu.be/sXx_ij8H7-k

<https://youtu.be/KkNjivOSpTw>



LESSON PLAN

CHAPTER NAME : HUMAN EYE AND COLOURFUL WORLD

CLASS : 10TH CLASS ,Chapter 10

NO.OF PERIODS : 07

Aims of Education :

- ❖ Rational Thought and independent thinking.
- ❖ Democratic & Community Participation.

Aims of science Education:

- ❖ Scientific understanding of human eye and colourful world terms develop through observations ,questions expressions and activities.
- ❖ Understanding of the relation between science and technology on basing human eye and colourful world.
- ❖ Probing good questions observing human eye and colourful world
- ❖ The abilities to draw structure of human eye ,defects of human eye and its corrections.
- ❖ Understanding the parts of human eye,defects of human eye and scattering of light ,dispersion of light.

CURRICULAR GOALS AND COMPETENCIES:

CURRICULAR GOAL : Explores the physical world around them and understands scientific principles and laws based on observations and analysis.

COMPETENCIES : Explain the relation between wave speed, frequency and wave length and find the relation between scattering of light with size of the atom or molecule .

Manipulates the position of object and properties of eye lenses and observe the image characteristics and corresponding of eye defects.

Defines power of accommodation, eye defects, power of lens, scattering of light, dispersion of light and Tyndall effect etc.

CURRICULAR GOALS : Explores the structure and function of the living world at the cellular level.

COMPETENCIES : Explain the structure of human eye and how the parts are functioning.

Define types of eye defects.

Differentiate eye defects (myopia, hypermetropia and presbyopia)

Describes and explain the common defects of myopia, hypermetropia, presbyopia and its corrections.

CURRICULAR GOALS : Explores interconnection between organisms and their environment.

COMPETENCIES : Identify the structure of human eye and various parts.

Illustrate different parts and its functions of human eye in order to understand how human beings see the objects around them.

Analyses the importance of light in the function of human eye.

CURRICULAR GOALS : Draws linkage between knowledge and knowledge across other Curricular areas.

COMPETENCIES : Explain how scientific concepts involved in human eye and the defects of human eye.
Examine a case study of Braille history and its working system.
Applies scientific principle to explain Tyndall effect ,blue colour of sky and red colour of sun at sunrise and sunset.

CURRICULAR GOALS : Knows and explains the significance contributions of Indian scientist Sir C.V Raman-Effect and inventions,discoveries,scattering of light.

COMPETENCIES : Develops awareness of the most current discoveries ,ideas and frontiers in all areas of scientific knowledge in order to appreciate that science in ever evolving and that there are still many unanswered questions.
States questions related to human eye defects ,corrections and precautions.

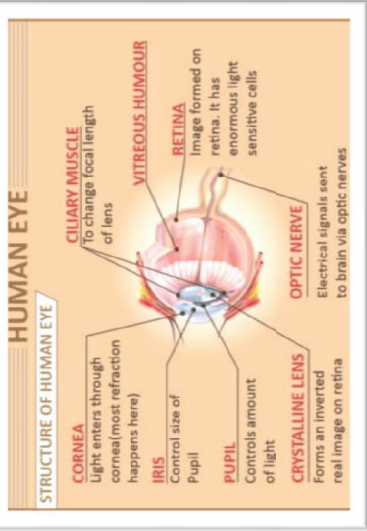
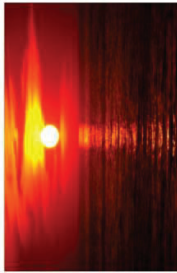
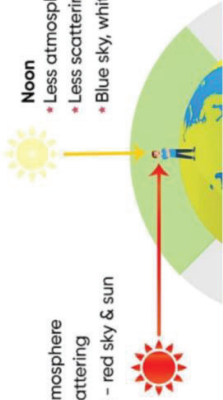
CURRICULAR GOALS : Explores the nature of science by doing science.

COMPETENCIES : Develops accurate and appropriate models of optic system and technology.
Designs new scientific instruments to assist doctors in recognizing eye defects easily and also in surgical methods in minimizing the vision defects.

MIND MAP OF HUMAN EYE AND THE COLORFUL WORLD

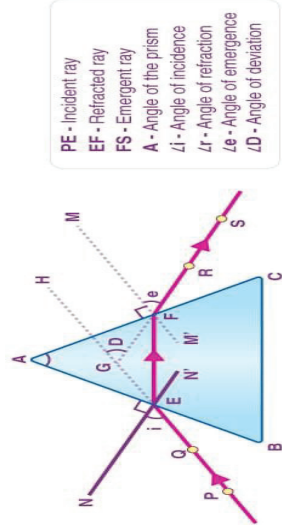
Blue Sky and Red Sunsets

- Molecules in atmosphere scatters lights rays
 - Shorter wavelengths (blue, violet) are scattered more easily
- Noon**
- Less atmosphere
 - Less scattering
 - Blue sky, white sun
- Sunset**
- More atmosphere
 - More scattering
 - Orange - red sky & sun



ATMOSPHERIC REFRACTION

In the **Atmosphere**, we have several layers having different optical densities. The refraction of light caused by earth's atmosphere having layers of air of varying optical densities is called **Atmospheric Refraction**.



- PE - Incident ray
- EF - Refracted ray
- FS - Emergent ray
- A - Angle of incidence
- r - Angle of refraction
- e - Angle of emergence
- D - Angle of deviation

NORMAL EYE

Light rays enter the pupil and pass through the cornea and eye lens. The focal point reaches the back of the retina creating a clear image.

MYOPIA

Light rays enter the eye but the focal point is in front of the retina and does not reach the surface. Causing images in the distance to be blurred.

HYPEROPIA

The focal point of the light rays entering the eye are behind the retina causing visions closeup but clear vision in the distance.

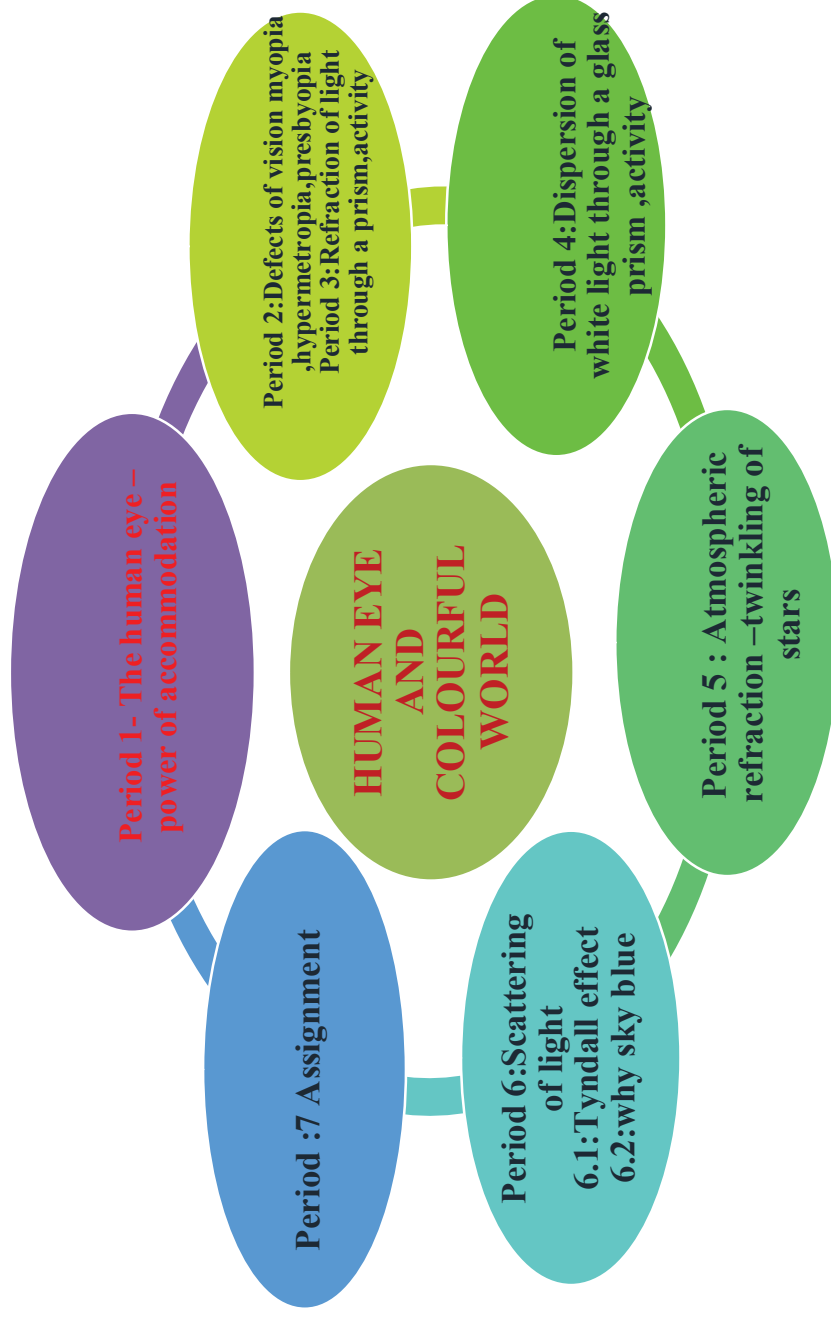
PRESBYOPIA

Similar to Hyperopia where the focal point of the light rays reach behind the retina. However the cause is the physical change in the eye lens creating blurred images at reading distance.



Power of Accommodation: The ability of the eye to focus objects lying at different distances is called the power of accommodation of the eye.

PERIOD WISE LESSON DIVISION




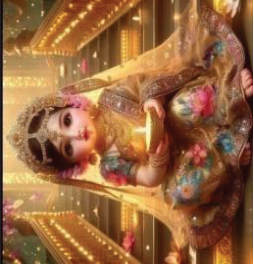
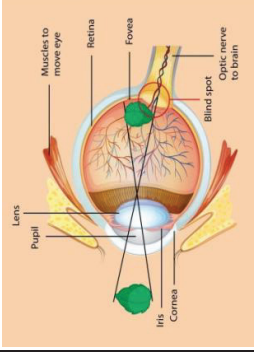

PERIOD WISE & CONCEPT WISE LEARNING OUTCOMES

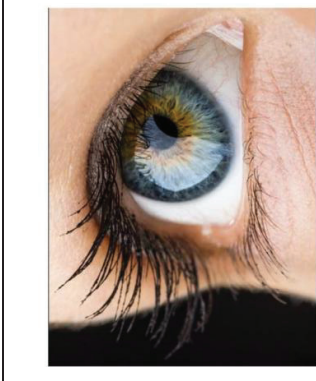
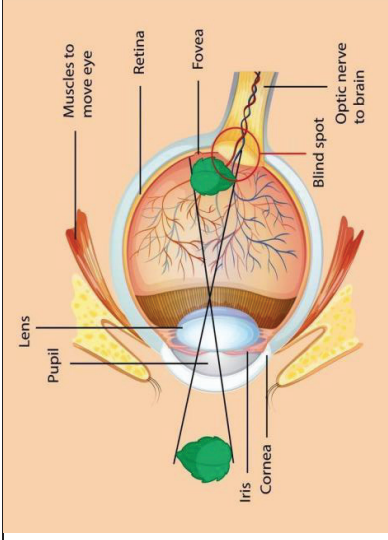
Period No	Period and Topics	Learning Outcomes
1	The human eye / power of accommodation	<p>Illustrate the parts and functions of human eye in order to understand human see the vision of human eye.</p> <p>Identifies different parts of human eye.</p> <p>Draws structure of human eye and label its parts.</p>
2	Defects of vision— myopia, hypermetropia and presbyopia	<p>Classifies defects of human eye.</p> <p>Draws defects diagrams for eye and correction defects using lens for human eye.</p>
3	Refraction of light through a prism	<p>Draws labeled diagram for various concepts of light.</p> <p>Plans and conducts investigations and experiments to arrive at the verifying the facts of refractive index.</p> <p>Calculates refractive index using the given data.</p>
4	Dispersion of white light through a glass prism	<p>Applies concept of dispersion to hypothetical situations of dispersion of light.</p> <p>Trace the path of white light rays through a prism, in order to determine that white light is made of seven colours.</p>
5	Atmospheric refraction -twinkling of stars	<p>Explains the processes of atmospheric refraction.</p> <p>Explain the reason behind twinkling of stars.</p>
6	Scattering of light-Tyndall effect-why is the colour of the clear sky is blue - color of the sun at sunrise sunset	<p>Relates processes and phenomena with causes and effects of blue colour of sky due to scattering of light.</p> <p>Explains processes and phenomena of sky appears white some times.</p>

PERIOD - 1

- Class : X
- Chapter : HUMAN EYE AND COLOURFUL WORLD
- Total No.of Periods : 6
- Period No : 1
- Topic : The Human Eye – Power of Accommodation.
- Key Concepts : Human Eye, Power of accommodation, Parts of human eye.

Learning Outcomes	Teaching Learning Process	Pointers for assessment.	Materials required
<ul style="list-style-type: none"> ❖ Explains different parts of human eye and how is it working. ❖ Explains how eyes works? ❖ Exhibits creativity in designing models using eco-friendly 	<p>Teacher ask some understanding questions for prior knowledge</p> <ul style="list-style-type: none"> ✓ How many of you know about very important sense organ in our body to see beautiful nature? ✓ How can we see object with our eyes? ✓ Can you see the object without light? ✓ Which one is the most valuable and sensitive sense organs in our body? <p>Teacher shows a picture and asks some questions.</p>	<ul style="list-style-type: none"> ✓ What is the angle of vision of human eye? ✓ The least distance of distinct vision for a young adult with normal vision is about <ul style="list-style-type: none"> A] 25m B] 2.5cm C] 25cm D] 2.5 m ✓ Are we able to see all the objects in front of our 	<p>Beautiful girl picture shown on IFP.</p> <div style="text-align: center;">  </div> <p>Human eye image shown on IFP/CHART</p>

<p>resources.</p> <ul style="list-style-type: none"> ❖ Describe the function of human eye and its parts ❖ Identifies and gives answers to the questions of functions of human eye. ❖ Understanding power of accommodation. ❖ Show the Interest to give answers to the questions on human eye. 	 <ul style="list-style-type: none"> ✓ Is this picture beautiful? ✓ How did you able to see this beautiful picture? ✓ Which sense organ helps you to view the picture? ✓ why do we have two eyes? <p>Teacher will show human eye and explain clearly, complete the topic and asks some questions to understand parts of human eye</p>	<p>eye clearly?</p> <ul style="list-style-type: none"> ✓ With both eyes open, a persons field of view is about? <ul style="list-style-type: none"> A. 90° B. 150° C. 180° D. 360° ✓ Draw and label diagram of human eye? ✓ How do we see colours? ✓ What is the function of human eye? ✓ What is stereoscopic vision? ✓ Which part of the eye controls the amount of light entering in the eye? ✓ Write parts of human eye? ✓ Which part of the eye sends the signals to the brain? 	 <p>Working of human video shown IFP/BYJUS TAB</p> <p>https://youtu.be/zyzphSTkW2U?si=fm40ZFt3_S0WeEil</p> 
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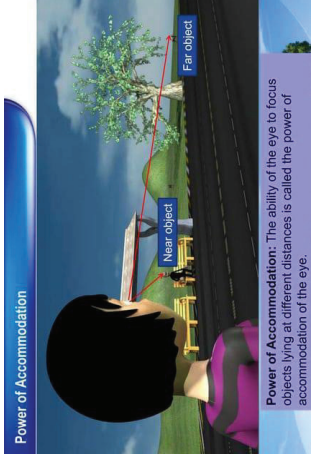


✓ What is the power of accommodation?
 ✓ How much value of power of accommodation of normal eye?
 ✓ The brain interprets which signals?
 ✓ The human eye forms the image of an object at its
 (a) cornea
 (b) iris
 (c) pupil
 (d) retina
 ✓ What are characters of iris?
 ✓ Which regulates and controls the amount of light entering the eye?
 ✓ Which part of the eye is called retina?

✓ In which part of the human eye the image of an object is formed?
 ✓ Which part of the eye is called the window to the outside world?
 ✓ What is the function of cornea?
 ✓ What is the white portion of the human eye called?
 ✓ What is the colored portion of the eye?
 ✓ What is the protective layer of the eye?
 ✓ The hale centre of the eye is called
 ✓ What is the diameter of eyeball ?
 ✓ What is the front layer of the eye ?
 ✓ What is the refractive index of cornea?
 ✓ What is the refractive index of air ?
 ✓ Why different people have different coloured eyes ?
 ✓ How does iris function ?
 ✓ What is the power of accommodation of eye?

Power of accommodation video shown on IFP/BYJUS TAB.
<https://youtu.be/zLUxn7e8dXI?si=ZAf48YgQrKkPmd>




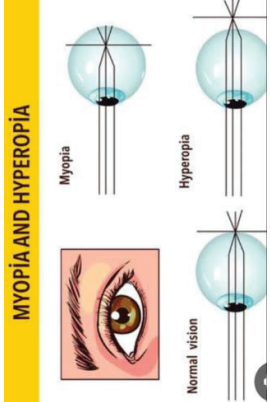
	 <p>Power of Accommodation: The ability of the eye to focus objects lying at different distances is called the power of accommodation of the eye.</p> <ul style="list-style-type: none"> ✓ What is the purpose of aqueous humour? ✓ What is transparent soft and flexible of human eye ? ✓ Which type of lens does the human eye have ? ✓ What is the refractive index of eye lens? ✓ What are ciliary muscles? ✓ What is the function of vitreous humor? ✓ Which part of the eye is called screen? ✓ Where rods and cones are found? ✓ What is the purpose of rods ? ✓ What is the purpose of cones? ✓ Which transmits all the visual information from the retina to the brain? ✓ what is a blind spot? ✓ What type of image is formed on the retina? 	<ul style="list-style-type: none"> ✓ Explain the working of ciliary muscles? ✓ How many cones and rods are there in our eye? ✓ Which type of lens is there in our eye? <p>Q Having two eyes facilitates in</p> <p>A : Increasing the field of view B : Bringing three-dimensional view C : Developing the concept of distance/ size</p> <p>Then the correct option is/are (a) A only (b) A and B only (c) B only (d) A, B and C</p> <p>Q. The black opening between the aqueous humour and the lens is called (a) retina (b) iris (c) cornea (d) pupil</p>	
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	<ul style="list-style-type: none"> ✓ Which controls the size of the pupil? ✓ Do you think eye is like an autofocus camera? ✓ What is least distance of distinct vision? 	<p>Q.The ability of eye lens to adjust its focal length to form a sharp image of the object at varying distances on the retina is called</p> <p>(a) Power of observation of the eye (b) Power of adjustment of the eye (c) Power of accommodation of the eye (d) Power of enabling of the eye</p>	
<p>Teacher Reflections & Experience :</p> <ol style="list-style-type: none"> 1. What were my strengths during the lesson? 2. In what areas can I improve as a teacher? 3. How can I continue to develop my teaching skills and practices? 			


PERIOD - 2

Class : X
Chapter : HUMAN EYE AND COLOURFUL WORLD
Total No.of Periods : 6
PERIOD NO : 2
TOPIC : Defect of vision & corrections – Myopia, Hypermetropia, Presbyopia
Key Concepts : Defects of eye, myopia, hypermetropia, presbyopia.

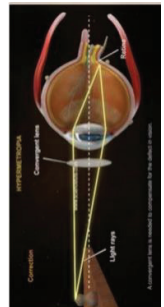
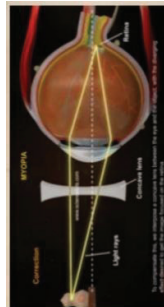
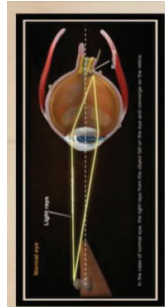
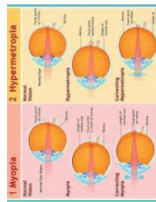
Learning Outcomes	Teaching Learning Process	Pointers for assessment.	Materials required
❖ Understanding defects of human eye. ❖ Recognizes different types of eye defects.	Recall the previous knowledge Teacher asks some understanding questions about defects of human eye. ✓ Do you know about how much percentage of persons suffering from nearsightedness in the world? ✓ Did you know how many years it took place to develop the first spectacles to use ? ✓ Do you know how we refer to a correct vision?	✓ How eye problems occur? ✓ How many types of eye	Defects of human eye video shown on IFP/BYJUS TAB. https://youtu.be/kL22is0A17w?si=meuNNBPK0SOle1bQ  https://www.youtube.com/watch?v=wZfintZXUbo

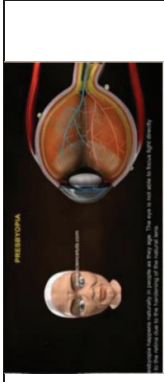
- ✓ Which age persons, more than 90% people have cataract?
 - ✓ Teacher shows the video of defects of human eye and ask some questions?
- MYOPIA AND HYPEROPIA**
- 
- ✓ Are you able to read the book when it is brought very close to your eyes?
 - ✓ how would you feel to read when the book is kept very far from your eyes?
 - ✓ We can see clearly far objects and we cannot see near objects clearly, that defects is called?
 - ✓ Which lens do we use for correcting of myopia?
 - ✓ Which lens we used for correction of hypermetropia?

- defects are there?
- ✓ A student has difficulty reading the black board while sitting in the last row .what could be the defect the child is suffering from which type of eye defect?How can it be corrected?
 - ✓ What is myopia?
 - ✓ What is hypermetropia?
 - ✓ At which age, the eye loses its power of accommodation?
 - ✓ What is presbyopia?
 - ✓ A person with a myopic eye cannot see objects beyond 1.2 m distinctly. what should be the focal length of corrective lens used to restore proper vision?
 - Q.Myopia and hypermetropia can be corrected by (a) Concave and plano-



Defects of human eye images shown on IFP/CHART.





convex lens
 (b) Concave and convex lens
 (c) Convex and concave lens
 (d) Plano-concave lens for both defects.
 Q. One cannot see through the fog, because
 (a) refractive index of the fog is very high
 (b) light suffers total reflection at droplets
 (c) fog absorbs light
 (d) light is scattered by the droplets
Q. Bi-focal lenses are required to correct
(a) astigmatism
(b) coma
(c) myopia
(d) presbyopia

✓ Which lens we used for the correction of presbyopia?
 ✓ What is the far point and near point of the human eye with normal vision?
 ✓ which is possible to correct the refractive defects of eye in now a days?

Task: Fill in the table
 Use the table to compare and contrast normal vision, myopia and hypermetropia.

	Normal vision	Myopia	Hypermetropia
Where is the image formed?			
Why does this happen?			
What can be done to correct this, if necessary?			

Task: Draw and complete your diagram to show short sightness and long sightness.

Short sightness (myopia)

Long sightness (hypermetropia)

2 • 100%

Teacher Reflections & Experience :

1. Was the pacing of the lesson appropriate?

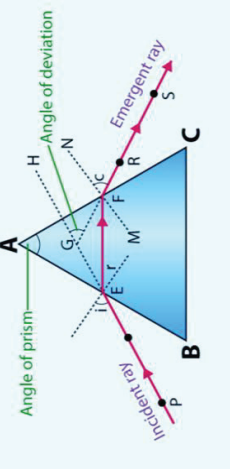


2.. Did I cover all the planned content without rushing or leaving gaps?

3.. How can I better manage the time allocated for each activity?

PERIOD - 3

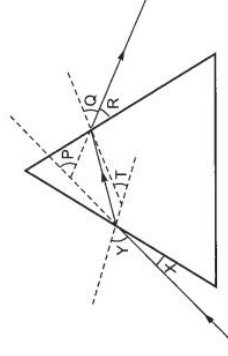
Class	: X
Chapter	: HUMAN EYE AND COLOURFUL WORLD
Total No.of Periods	: 6
Period No	: 3
Topic	: Refraction of light through glass prism.
Key Concepts	: Refraction, Prism, Deviation.

Learning Outcomes	Teaching Learning Process	Pointers for assessment.	Materials required
<ul style="list-style-type: none"> ❖ Understands refraction of light through prism ❖ Observes how light is bending. ❖ Draw diagram of refraction of light through a prism. 	<p>Recalls the previous knowledge : Teacher explains the refraction of a light through a prism by an activity and asks some questions to students.</p> <ul style="list-style-type: none"> ✓ How would light get refracted through a transparent prism? ✓ How many number of bases and lateral surface in a prism ✓ The angle between two lateral faces is called? ✓ Teacher shows Image and ask some questions. 	<ul style="list-style-type: none"> ✓ What is prism? ✓ What is the angle of deviation? 	<p>Triangular glass prism, cardboard white paper, pencil, scale, 86 pins.</p> <div style="text-align: center;"> </div> <p>Refraction of light through glass prism image shown on IFP/CHART.</p> <p>https://www.youtube.com/watch?v=hgzalFHT94</p>

<p>❖ Students answers.</p> <p>give</p>	 <p>Why the emergent ray has changed its path?</p> <p>Is this phenomena observed anywhere else also?</p> <p>PQ _____</p> <p>EF _____</p> <p>RS _____</p> <p>Angle A _____</p> <p>Angle i _____</p> <p>Angle r _____</p> <p>Angle e _____</p> <p>Angle D _____</p> <p>Is this similar to the kind of bending that occurs in a glass slab?</p> <p>What is angle of deviation?</p> <p>What is the refraction of light through a glass prism?</p> <p>What is the function of a prism?</p>	<p>✓ Draw the diagram of refraction of light through a glass prism?</p> <p>✓ Can a prism angle be zero?</p> <p>✓ Is the rectilinear propagation of light violated?</p> <p>✓ What is the maximum angle of deviation?</p> <p>✓ Can deviation for a prism be zero?</p> <p>Q.A student traces the path of a ray through a glass prism for four different values of angle of incidence. On analysing the diagrams he is likely to conclude that the emergent ray</p> <p>(a) is always parallel to the incident ray.</p> <p>(b) is always perpendicular to the incident ray.</p> <p>(c) is always parallel to the refracted ray.</p>	 <p>https://www.youtube.com/watch?v=SrgH5mfq1wU</p>  <p>Refraction of light through glass prism activity video shown on IFP/BYJU'S TAB or any other sources for interest.</p>
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(d) always bends at an angle to the direction of the incident ray.

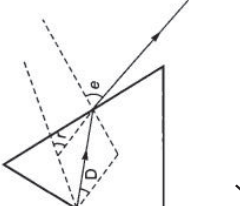
Q. In the following diagram, the path of a ray of light passing through a glass prism is shown:



In this diagram the angle of incidence, the angle of emergence and the angle of deviation respectively are (select the correct option):

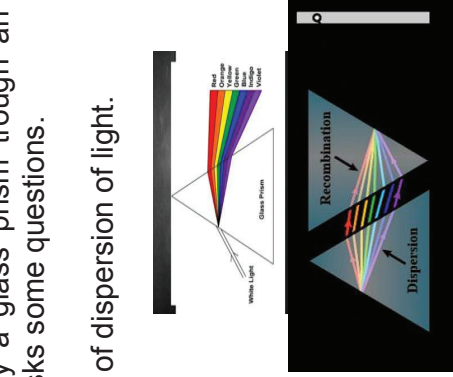
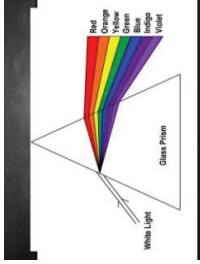
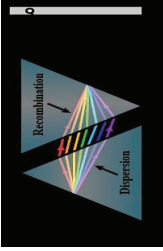
- (a) X, R and T
- (b) Y, Q and T
- (c) X, Q and P
- (d) Y, Q and P

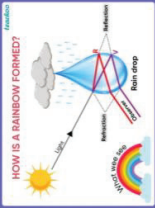

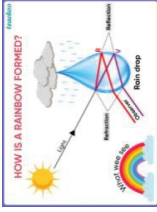
Q. After tracing the path of a ray of light through a glass prism a student marked the angle of incidence ($\angle i$), angle of refraction ($\angle r$), angle of emergence ($\angle e$)

		<p>and the angle of deviation ($\angle D$) as shown in the diagram. The correctly marked angles are:</p>  <p>(a) $\angle i$ and $\angle r$ (b) $\angle i$ and $\angle e$ (c) $\angle i$, $\angle e$ and $\angle D$ (d) $\angle i$, $\angle r$ and $\angle e$</p>	
<p>Teacher Reflections & Experience :</p> <ol style="list-style-type: none"> 1.. Did I assess student understanding effectively during the lesson? 2.. Did I provide timely and constructive feedback to guide their learning? 3.. How can I improve my assessment and feedback practices? 			

PERIOD - 4

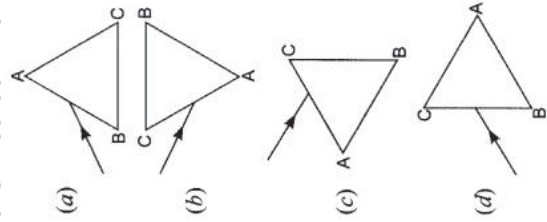
Class : X
Chapter : HUMAN EYE AND COLOURFUL WORLD
Total No.of Periods : 6
Period : 4
Topic : Dispersion of Light through a glass prism.
Key Concepts : Dispersion, formation of a rainbow .

Learning Outcomes	Teaching Learning Process	Pointers for assessment.	Materials required
<ul style="list-style-type: none"> ❖ Understand dispersion of white light by a glass prism activity ❖ Analysis the dispersion of light ❖ Understands rainbow formation. 	<p>Recalls the previous knowledge : Teacher explains the dispersion of white light by a glass prism through an activity and asks some questions.</p> <p>Image of dispersion of light.</p> 	<ul style="list-style-type: none"> ✓ What in dispersion of light? ✓ What is the reason for dispersion? ✓ Which colour has greater speed? ✓ Which colour travels more? ✓ Which colour has longest wave length? ✓ Which shape is not a 	<p>Dispersion of light shown on IFP/chart</p>  <p>Recombination of the spectrum of light image shown on IFP/CHART</p> 

<p>❖ Appreciate rainbow formation.</p> <p>❖ Explains the process and phenomena of rainbow</p>	<p>in a rainbow?</p> <ul style="list-style-type: none"> ✓ What do you observe in a rainbow? ✓ What is the sequence of colours that you see on the screen? ✓ Which colour has maximum angle of the deviation? ✓ Which colour has minimum angle of the deviation? ✓ Which phenomena is responsible for dispersion of light? ✓ What do you understand by dispersion? ✓ What is called dispersion of light? ✓ Which colour bends the most? ✓ What is the principle of a prism? ✓ What are the types dispersion of light? ✓ Why does prism disperse light? ✓ What is the formula for dispersion? ✓ What is the angle of dispersion? ✓ Rainbow image shown.  <ul style="list-style-type: none"> ✓ How to form rainbow in a classroom? ✓ What is the concept of rainbow formation? ✓ Why is rainbow curved? ✓ How are double rainbow formed? ✓ What are the two types of rainbow formation? ✓ What is a full circle rainbow called? 	<p>prism?</p> <ul style="list-style-type: none"> ✓ What is spectrum? ✓ What is VIBGYOR? ✓ Who was the first person used a glass prism? ✓ Why danger signal are always painted red? ✓ Why do we get seven colours in the spectrum formed by a prism? ✓ Name the type of particles which acts as a prism in the formation of rainbow in the sky? ✓ When two prisms, One up and one down in contact, receives white light, What colour of light 	<p>DISPERSION OF LIGHT VIDEO SHOWN ON IFP/BYJUS TAB</p> <p>https://youtu.be/KCfR_iNsW6k?si=aSiPWrfm2bVf6ly</p>  <p>Rainbow image shown on IFP/CHART</p> 
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- ✓ What is a rainbow without rain is called?
- ✓ What is a reverse rainbow is called?
- ✓ Who discovered rainbow?
- ✓ Who named a rainbow?
- ✓ Which country is called rainbow?
- ✓ Can rainbows be formed without water?
- ✓ Can we create rainbow artificially?
- ✓ Can rainbow be formed at night?
- ✓ Why rainbow is formed after rain?
- ✓ Can we touch rainbow?
- ✓ Is rainbow a real?
- ✓ Which country has most rainbows?
- ✓ What is a rainbow formula?
- ✓ What is the angle of rainbow 180/360
- ✓ What is rainbow in chemistry?
- ✓ Why are rainbows so special?

will emergent out?
 Q. A prism ABC (with BC as base) is placed in different orientations. A narrow beam of white light is incident on the prism as shown in the figure. In which of the following cases, after dispersion, the third colour from the top corresponds to the colour of the sky?



(Ans: (b) In figure (a) base BC of the prism is at the bottom, then violet colour

Rainbow video IFP/BYJUS
<https://youtu.be/hY9GX2mpmnc?feature=shared>

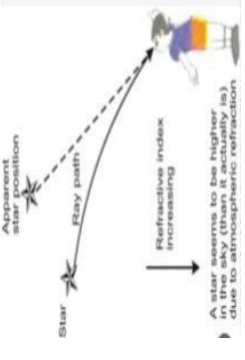


	<p>lies at the bottom but in figure (b), the base BC is at the top, then violet would be at the top after dispersion, and third colour would be blue.</p> <p>Q.Rainbow occurs due to which phenomena?</p> <ol style="list-style-type: none">1. Reflection2. Dispersion3. Refraction4. All of the above options <p>Q.When white light passes through a glass prism, one gets spectrum on the other side of the prism. In the emergent beam, the ray which is deviating least is or Deviation by a prism is lowest for</p> <p>A) Violet B) Green C) Red D) Yellow</p>	
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		<p>Q. In the formation of primary rainbow, the sunlight rays emerge at minimum deviation from rain-drop after</p> <p>A) One internal reflection and one refraction</p> <p>B) One internal reflection and two refractions</p> <p>C) Two internal reflections and one refraction</p> <p>D) Two internal reflections and two refractions</p>	
<p>Teacher Reflections & Experience :</p> <p>1. How can I increase student engagement and create a more interactive learning environment?</p> <p>2.. Did I assess student understanding effectively during the lesson?</p> <p>3. Did I provide timely and constructive feedback to guide their learning?</p>			

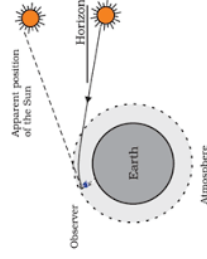
PERIOD - 5

Class : X
Chapter : HUMAN EYE AND COLOURFUL WORLD
Total No.of Periods : 6
PERIOD NO : 5
TOPIC : Atmospheric refraction Twinkling of stars, advance sunrise and delayed sunset.
Key Concepts : Atmospheric refraction, twinkling stars, sunrise and sunset

Learning Outcomes	Teaching Learning Process	Pointers for assessment.	Materials required
<ul style="list-style-type: none"> ❖ Understands the concept of Atmospheric refraction Twinkling of Stars Advanced Sun rise and Delayed Sun Set ❖ Explains processes and phenomena. 	<p>Recalls the previous knowledge : Teacher will explain atmospheric refraction clearly and asks some understanding questions.</p> <ul style="list-style-type: none"> ✓ What is the phenomenon of atmospheric refraction? ✓ How does atmospheric refraction affects sunrise and sun set timings? ✓ How will you observe Sun rise and Sun set? ✓ What is the Cause of delayed Sunset? ✓ How stars twinkling? 	<ul style="list-style-type: none"> ✓ Why planets do not appear twinkling? ✓ What is atmospheric refraction? ✓ Explain. Twinkling of Stars ✓ Advanced Sun rise and delayed Sunset ✓ Give an example of refraction in nature? 	<p>*Atmospheric refraction image shown on IFP/CHART</p>  <p>Atmospheric refraction video shown on IFP/BYJU'S Tab https://youtu.be/c9y5nwok1to?feature=shared</p>



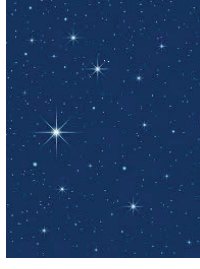
✓ What is the reason for early sunrise and delayed sunset ?



- ✓ Why are sunsets fast some times?
- ✓ Will you give some examples of atmospheric refraction?
- ✓ What is the effects of atmospheric refraction?
- ✓ What are the factors affecting atmospheric refraction?



Twinkling of stars images shown IFP/Chart



*Twinkling of stars video shown on IFP/BYJU'S

<https://youtu.be/rd3P6vh4kpE?feature=shared>



✓ Give examples of atmospheric refraction?

✓ Name the phenomena due to which we get light from sun before sunrise?

✓ Name the atmospheric phenomenon due to which the sun can be seen above the horizon about two minutes before actual sunrise?

Q. Continuous deviation of light through different densities of layers of atmosphere is due to....

- a) refraction of light b) reflection of light c) scattering of light d) atmospheric refraction.

Q. Planets do not twinkle because of...

- a) planets are closer to earth than stars b) planets are bigger in size c) they reflects the light coming from d) all of these

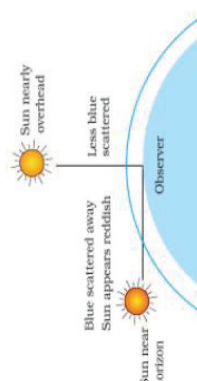
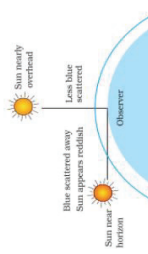

		<p>Q. At the time of sunrise and sunset, the rays are appears to travel.....path due to refraction from atmosphere</p> <p>a) random b) straight line c) curve d) zigzag</p> <p>Q. Sun can be visible almost 2 minute before actual time of sunrise due to refraction of sun rays from atmosphere changes the position is known as....</p> <p>a) early sunrise b) sun shift c) refraction of sun rays d) advanced sunrise</p> <p>Q. Harshit is trying to observe the star in sky, but he finds that position of star is changes continuously, it happens due to.....</p> <p>a) reflection of light from star b) atmospheric refraction c) scattering of light d) dispersion of light</p>	
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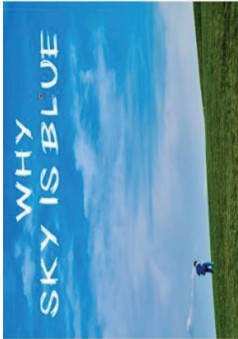
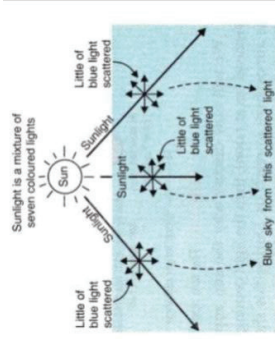


Teacher Reflections & Experience :

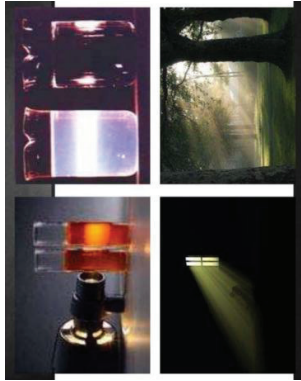


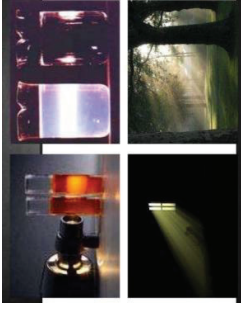
1. Were there any disruptions or behavioural issues that I need to address?
2. What strategies can I implement to improve classroom management?
3. Did the students actively participate and show interest in the lesson?

PERIOD - 6

Class	: X
Chapter	: HUMAN EYE AND COLOURFUL WORLD
Total No.of Periods	: 6
Period No	: 6
Topic	: Scattering of light -Tyndall effect, blue colour of sky, Sun rise and Sun set appears Red in colour.
Key Concepts	: Scattering, Tyndall effect, blue colour of sky, Sunrise and sunset appears red colour.

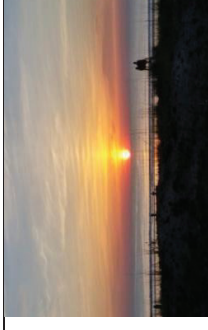
Learning Outcomes	Teaching Learning Process	Pointers for assessment.	Materials required
<ul style="list-style-type: none"> ❖ Understanding scattering of light. ❖ Observe scattering of light ❖ Observe Tyndall effect. ❖ Relates process and phenomena with causes and effects ❖ Explains why sky is blue in colour. 	<p>Recalls the previous knowledge :</p> <ul style="list-style-type: none"> ✓ Have you seen Tyndall effect in nature? ✓ do you think the sky is blue in colour ? ✓ Are you observe why is the sunrise and sunset appears red in colour ✓ Teacher will explain scattering of light clearly after asks some questions for understanding. <div style="text-align: right;">  <p>The diagram shows two scenarios of light scattering. In the first, the sun is 'near horizon', and light travels a long distance through the atmosphere, appearing 'reddish'. In the second, the sun is 'nearly overhead', and light travels a shorter distance, appearing 'blue'. Labels include 'Sun near horizon', 'Blue scattered away Sun appears reddish', 'Sun nearly overhead', 'Less blue scattered', and 'Observer'.</p> </div>	<ul style="list-style-type: none"> ✓ What is meant by scattering of light? ✓ What is tyndall effect? Give few examples? ✓ Which phenomenon is 	<p>Scattering of light IMAGE shown on IFP/CHART</p> <div style="text-align: right;">  <p>The diagram shows two scenarios of light scattering. In the first, the sun is 'near horizon', and light travels a long distance through the atmosphere, appearing 'reddish'. In the second, the sun is 'nearly overhead', and light travels a shorter distance, appearing 'blue'. Labels include 'Sun near horizon', 'Blue scattered away Sun appears reddish', 'Sun nearly overhead', 'Less blue scattered', and 'Observer'.</p> </div> <p>Tyndall effect IMAGE shown on IFP/CHART</p> <div style="text-align: right;">  <p>The diagram shows two scenarios of light scattering. In the first, the sun is 'near horizon', and light travels a long distance through the atmosphere, appearing 'reddish'. In the second, the sun is 'nearly overhead', and light travels a shorter distance, appearing 'blue'. Labels include 'Sun near horizon', 'Blue scattered away Sun appears reddish', 'Sun nearly overhead', 'Less blue scattered', and 'Observer'.</p> </div>

<ul style="list-style-type: none"> ❖ Differentiating which materials formed Tyndall effect and which materials formed not Tyndall effect. ❖ Relates process and phenomena with causes and effects. ❖ Applies learning to hypothetical situations. 	<ul style="list-style-type: none"> ✓ What are the effects of scattering of light? ✓ What is the Tyndall effect?  <ul style="list-style-type: none"> ✓ What is scattering of light? ✓ Which light scatters the most? ✓ Why is the sky blue in colour?  	<p>responsible for making the path of light visible?</p> <ul style="list-style-type: none"> ✓ Give to more instances of Tyndall effect? <p>What is the reason behind sky is blue?</p> <ul style="list-style-type: none"> ✓ Why clouds appear white though sky appears to be blue? ✓ Some clouds appear white some appear grey and some appear black. Explain how scattering of light by the clouds results in three different colours? ✓ The molecules of Oxygen and Nitrogen are more effective in scattering of light why? 	 <p>Tyndall effect video shown on IFP/BYJU'S.</p> <p>https://youtu.be/FvSxcUNtew8?si=xgqxXUmXRyq7pGg</p>  <p>Why sky blue in colour video shown on IFP /BYJU'S .</p> <p>https://youtu.be/ehUllnKhzDA?si=o5Am8IS7IFXLoAfK</p>
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	<p>✓ Which materials formed Tyndall effect?</p>  <p>✓ Which materials do not show Tyndall effect?</p> <p>✓ Why does the sky appear blue on a clear day?</p> <p>✓ Why does sky appear black to an astronaut instead of blue?</p> <p>✓ What causes the scattering of blue component of sunlight in the atmosphere?</p> <p>✓ Shall we know why sunrise and sunset appears in red?</p>	<p>✓ Why does the sky appear dark instead of blue to an astronaut?</p> <p>✓ Which component of white light is least scattered by fog or smoke?</p> <p>✓ What happens when a beam of sunlight enters in dusty room through a window?</p>	  <p>Tyndall effect images shown on IFP/Chart .</p> 
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- ✓ Why does sun appear red at sunrise and sunset?
- ✓ Out of blue and red light, which one is scatters more?
- ✓ Why sun appears white at noon?
- ✓ Let us know about sir C.V.Raman because he did many experiments on the basis of scattering of light



Sunrise and sunset appear red in color video shown on IFP /BYJU'S.

<https://youtu.be/gmtrih98Wg0?si=7pD5QilztWVsvHho>



video shown on sir CV Raman on IFP

<https://www.youtube.com/watch?v=Z6ApD-qlgZs>

✓ What will be the colour of the sky when it is observed from a place in the absence of any atmosphere?

✓ Why sun appears red while sunrise and sunset?

Q.The phenomenon of scattering of light by the colloidal particles is known as.....

a) Raman effect b) Newton's ring c) Spectral effect d) Tyndall effect

Q.The sky would have appeared.....in colour if earth doesn't have atmosphere.

a) blue b) red c) black d) white

Q.Which colour will be observed by an astronaut



travelling in space?

- a) red
- b) blue
- c) indigo
- d) black

Q. Who is the only Indian scientist to win noble price in Physics for his discovery on scattering due to colloidal solution?

- a) Sir J.C. Bose
- b) Sir C.V. Raman
- c) Sir A.P. J. Kalam

d) Sir Venkatraman Ramakrishnan

Q. The day of discovery of Raman effect which India celebrates as National science day is

- a) 28 Feb
- b) 8 March
- c) 14 April
- d) 30 Oct

Q. Red and green colours are preferred in traffic signals because.....

- a) red and green colours have large wavelength
- b) these colours scatter least

c) there is less absorption of

		these colours d) all of these	
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1. Did I clearly communicate the lesson objectives to the students?
2. How can I ensure that students understand the objectives and can demonstrate their knowledge or skills related to them?
3. Did I use effective instructional strategies to engage students in the lesson?
4. How can I improve the variety and effectiveness of my teaching methods to cater to different learning styles and needs?
5. How well did I manage the classroom during the lesson?

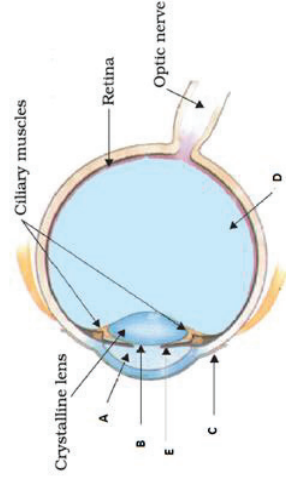
WORK SHEET-1

CHAPTER 10

HUMAN EYE AND COLOURFUL WORLD

ANSWER THE FOLLOWING QUESTIONS

1. A person advised to wear spectacles with concave lens. What type of defect of vision is he suffering from?
2. Explain clearly the working of human eye?
3. How does an eye focus the objects lying at various distances?
4. Why do clouds generally appear white?
5. Why do stars twinkle but not the planets?
6. How the colour of scattered light depends on the size of the scattering particles?
7. Why is wavering of object is seen when they are seen through a turbulent stream of hot air rising above a fire or radiation?
8. Label the parts of Eye correctly



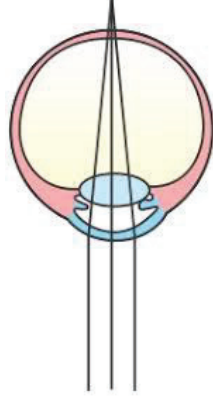
WORK SHEET-1

CHAPTER 10

HUMAN EYE AND COLOURFUL WORLD

ANSWER THE FOLLOWING QUESTIONS

1. Identify the defect in the eye ?



2. Give reasons.

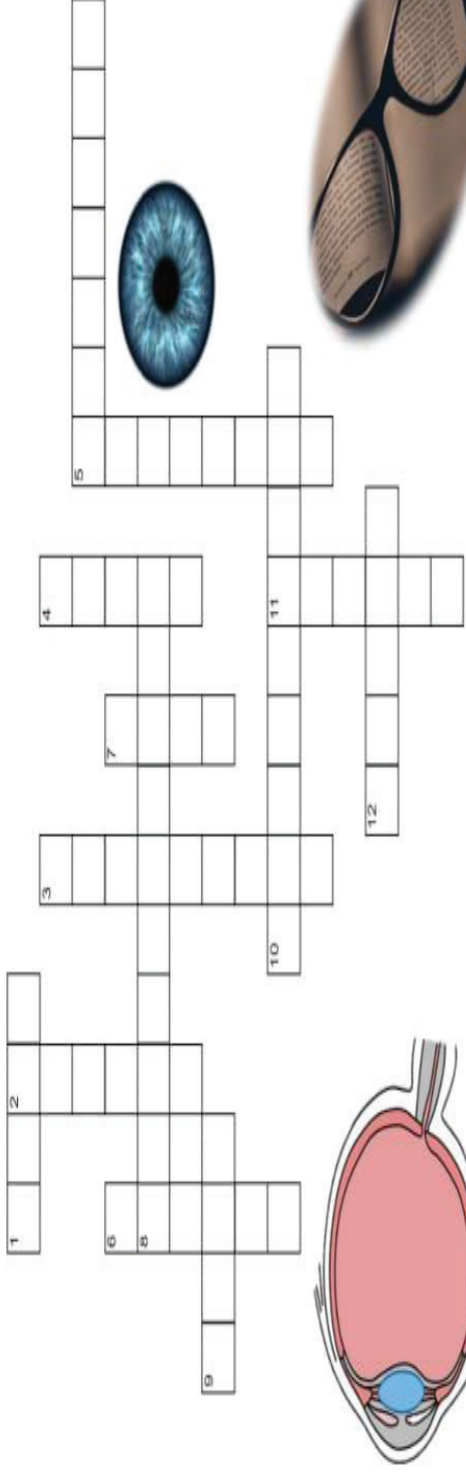
- No rainbow could be observed from the surface of moon by the astronauts. What could be the possible reason.
- If the earth has no atmosphere, What change would be observed in the length of day?

3. A got his eye tested the optician's prescription for the spectacles was left eye:3D, right eye:3.50dD. The person is having a defect of vision called.

- Presbyopia
- Myopia
- Astigmatism
- Hypermetropia.

4. Complete the following puzzle.

THE EYE CROSSWORD



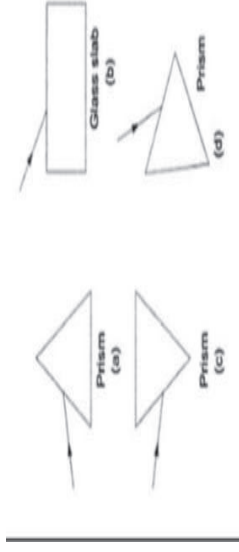
ACROSS

- 1) Receptor cells which detect differences in light intensity
- 5) Muscles which alter the shape of the eye
- 8) Carries visual information from the eyeball to the brain
- 9) Flexible structure that focuses light that has entered the eye
- 10) To reduce diameter
- 12) Opening through which light enters the eye

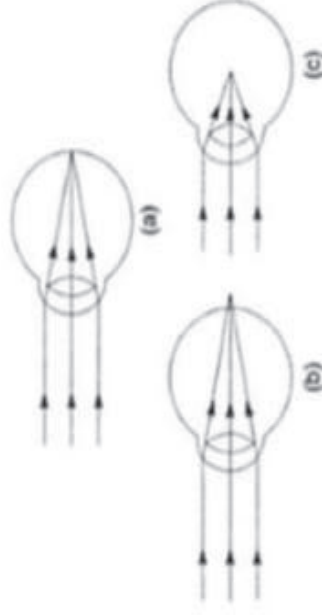
DOWN

- 2) To make wider
- 3) Point at which the optic nerve leaves the eye
- 4) Receptor cells which detect the colour of light
- 5) Build up of protein in the lens
- 6) Clear tissue that covers the front of the eye
- 7) Regulates the amount of light entering the eye
- 11) The layer of receptor cells at the back of the eye

5. In which of the following cases will no dispersion take place when sunlight passes through it?

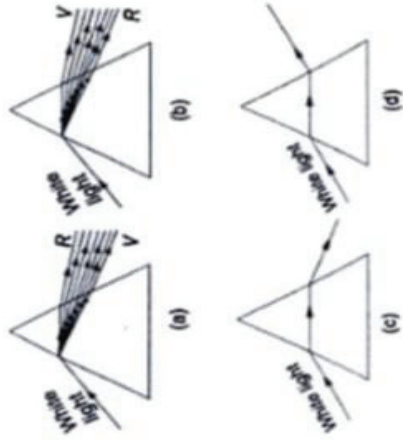


6. Figure a, b, c respectively; indicate the point in case of:

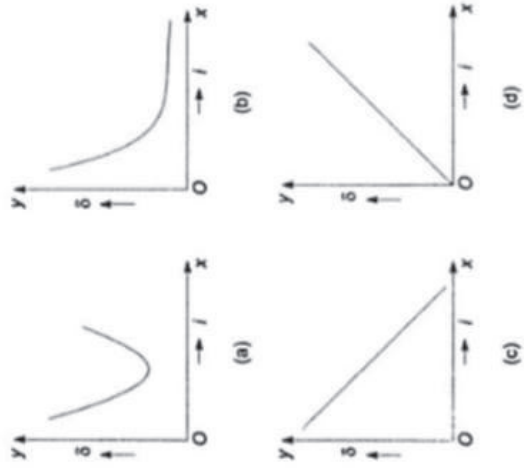


- a) The hypermetropia eye, the myopic eye and normal eye.
- b) The normal eye, the myopic eye and hypermetropia eye.
- c) The normal eye, the hypermetropia eye and myopic eye.
- d) The myopic eye, the normal eye and hypermetropia eye.

7. Which of the following figures correctly represents the passage of white light through prism?



8. Which of the following graph represents the correct variation of angle of incidence (i) and angle of deviation (δ)?

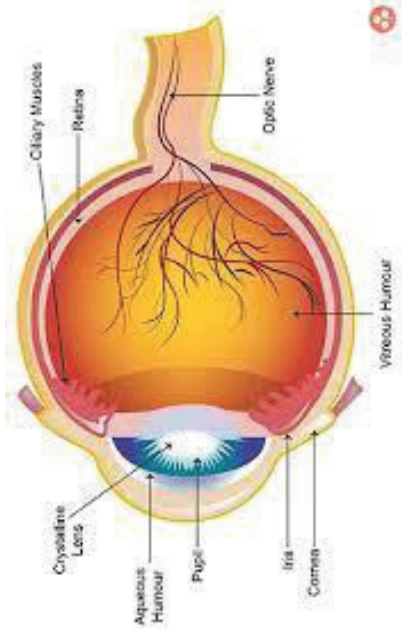


WORK SHEET-3

CHAPTER 10

HUMAN EYE AND COLOURFUL WORLD ANSWER THE FOLLOWING QUESTIONS

1. Write the functions of each of the following parts of Human eye.



- (i) Cornea
- (ii) Iris
- (iii) Crystalline Lens
- (iv) Ciliary Muscles

5 Marks

2. A person may suffer from both Myopia and Hypermetropia defects.

5 Marks

- (i) What is this condition called?
- (ii) When does it happen?
- (iii) Name the type of lens often required by the person suffering from this defect?
- (v) Draw a labelled diagram of such lenses.

3. Give reasons for

5 Marks

- (i) Red colour is selected for danger signals?
- (ii) The sky appears dark
- (iii) The time difference between actual sunset and apparent is about 2 minutes.



LESSON PLAN: SCIENCE
CLASS-10 CHAPTER-11 ELECTRICITY- 10 periods.

Aims of Education :

1. Rational thought and independent thinking/autonomy.
2. Democratic and community participation.

Aims of Science Education :

1. Scientific understanding of the natural and physical world.
2. Capacities for scientific inquiry.
3. Understanding the evolution of scientific knowledge.
4. Understanding of the relationship between science, technology and society.

Curricular Goals and Competencies :

Curricular Goals : Explore the physical world around them and understand scientific principles and laws based on observations and analysis.

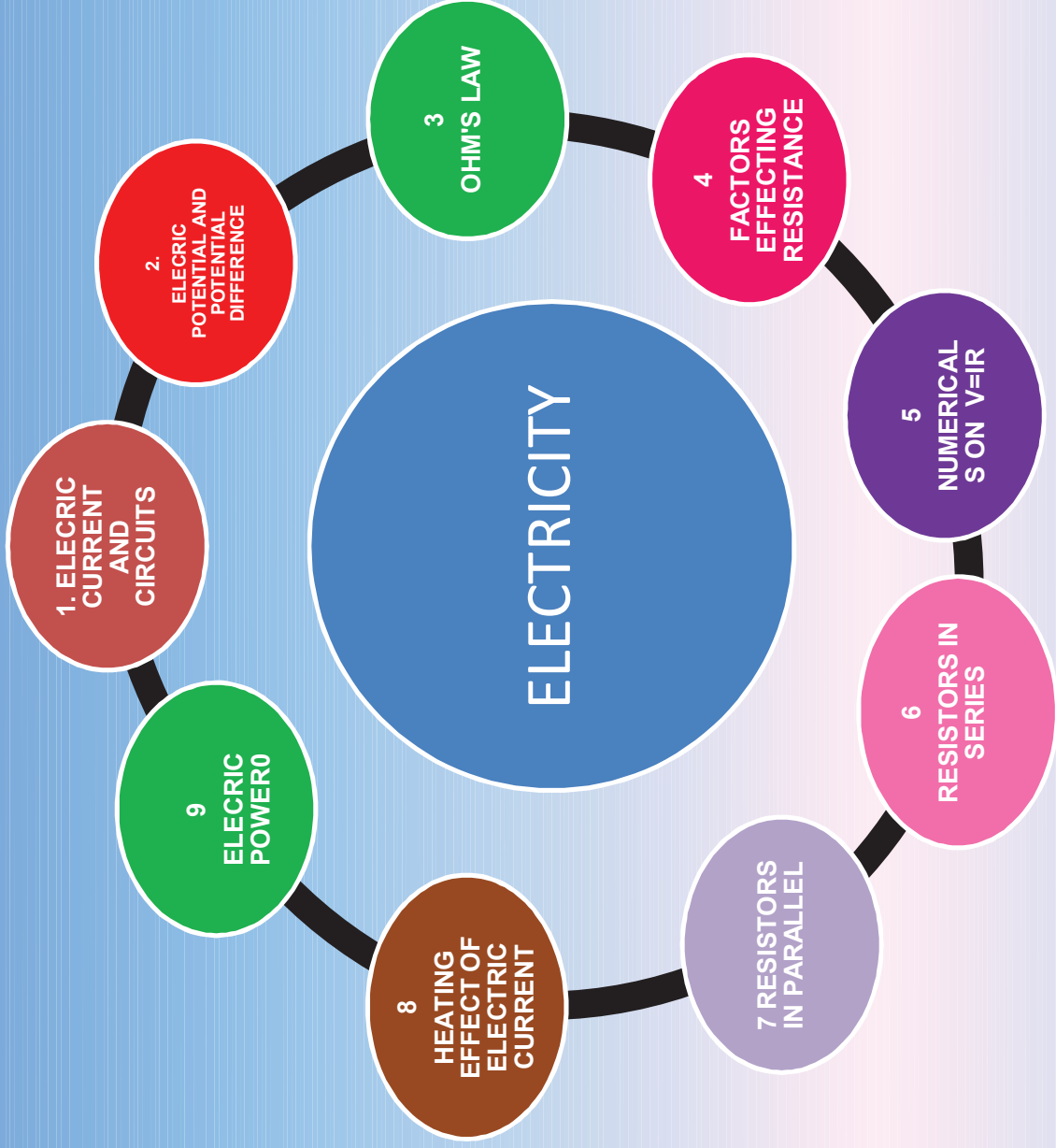
Competencies:

- Applies ordered flow of charges is electric current, the effect of potential difference is the cause for motion of charges and analysis of the diagrammatic representation of circuits and its components.
- Explains the relationship between electric potential difference and flow of charge i.e.; current and correct it to ohm's law.
- Manipulates and analyzes different characteristics of the circuit (current, voltage, resistance) and mathematics their relationship (ohm's law), and applies it to everyday usage (electricity bill, short circuit, safety measures).
- Defines Electric current, electric potential, resistance scientific terms and represents the relationship between rate of flow of charges and time, electric potential as relationship between amount of work done in moving charges by charged moved, resistance as ratio of potential difference and current.

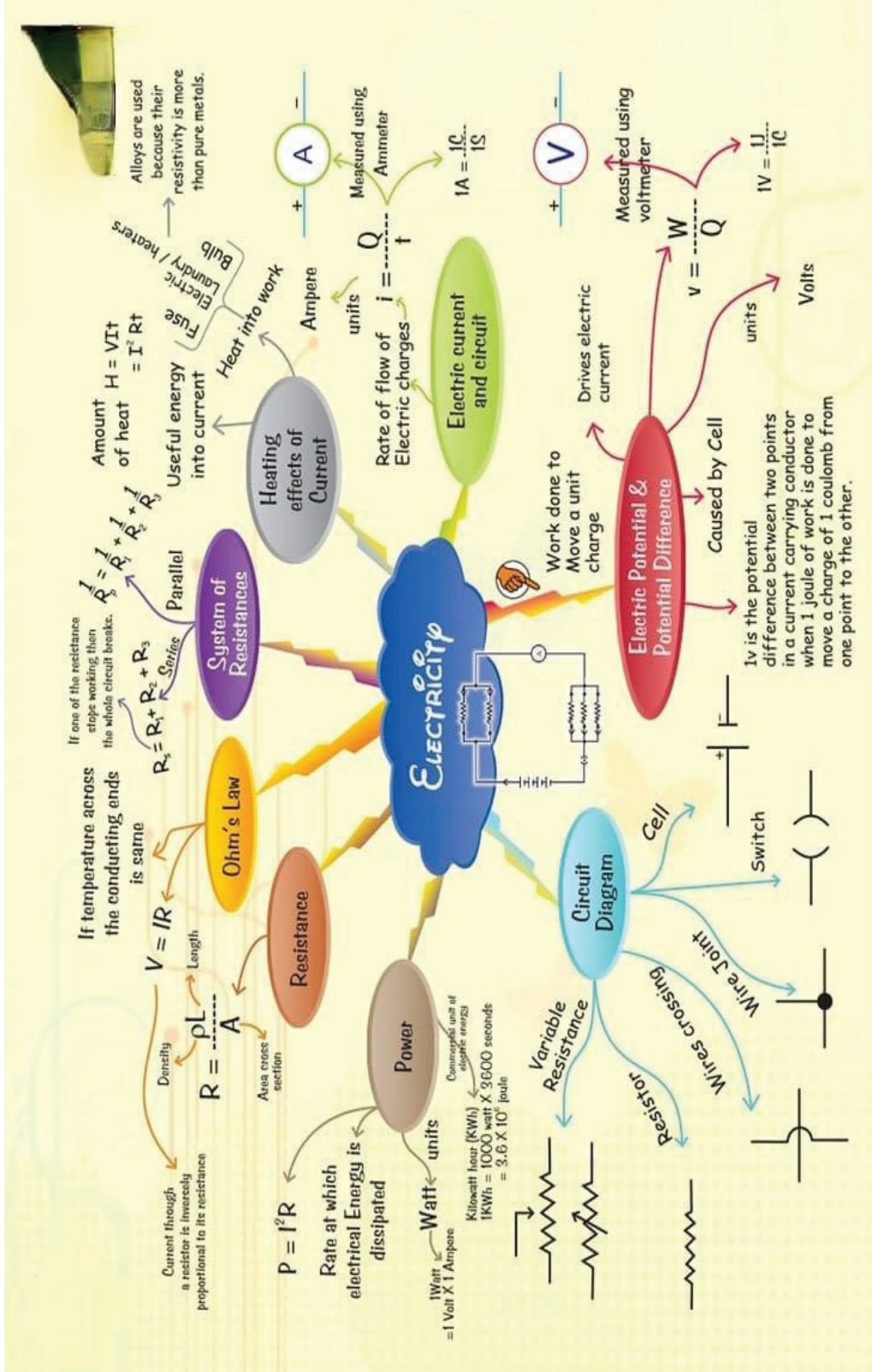
Period No	Topic	Learning Outcomes
1	Electric current, circuits, its components, circuit diagrams.	<ul style="list-style-type: none"> ❖ Develop awareness on electric charge, electric current, electric circuit, one ampere etc. Understands the electric components and circuits. ❖ Explores how to study electric circuit diagrams. ❖ Learns the formula used for finding electric current and calculates using the data given.
2	Electric potential and potential difference	<ul style="list-style-type: none"> ❖ Develops understanding about electric field, electric potential, electric potential and one volt. ❖ Draws linkages about the effect of potential difference is the cause for ordered flow of charges in a conductor. ❖ Learn $V = W/Q$ and use the formula and its units.
3	OHM'S Law	<ul style="list-style-type: none"> ❖ Explores the physical world around them and understands scientific principles and laws based on observations and analysis. ❖ Classifies materials around us based on abeyance of ohm's law. ❖ Conducts investigations and experiments to arrive at and verify to seek answers to queries on their own. ❖ Analyses and interprets data and graphs.
4	Factors on which the resistance of the conductor depends like resistivity.	<ul style="list-style-type: none"> ❖ Draw Conclusion about resistance
5	Numerical on Resistance $V=IR$	<ul style="list-style-type: none"> ❖ Describes the relationship between V,I andR ❖ Using Ohms Law and Learns the Formula and SI Units of Physical Quantities.
6	Resistors connected in Series.	<ul style="list-style-type: none"> ❖ Learner identifies when resistors are connected end to end resistance of the circuit increases.
7	Resistors connected in parallel and its advantages.	<ul style="list-style-type: none"> ❖ Derive expression for resistors in parallel.

8	Heating effect of Current & its applications.	<ul style="list-style-type: none"> ❖ Understands that when electric current flows through a high resistance wire the conductor heats up and produces heat. ❖ Law of heating derives a formula for heat. $H = VIT = I^2RT$
9	Electric Power	<ul style="list-style-type: none"> ❖ Defines electric power as the rate at which energy is dissipated in a circuit. ❖ Derives the Formula $P = VI = I^2R = \frac{V^2}{R}$ and - SI unit of power is watt.
10	Worksheet	

PERIOD WISE LESSON FLOW




CHAPTER MIND MAP



PERIOD PLAN - 1

CLASS	: X	CHAPTER	: ELECTRICITY	TOTAL NO. OF PERIODS	: 10
PERIOD NO	: 1	TOPIC	: ELECTRIC CURRENT AND CIRCUIT	KEY CONCEPTS	: Electric current, Circuit, Charge, Coulomb, Ampere, Ammeter, Voltmeter

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT.	MATERIALS REQUIRED
<ul style="list-style-type: none"> ❖ Understands and interprets the concept of Electric current, Electric circuit. ❖ Differentiates closed circuit and open circuit. ❖ Classify materials as conductors and insulators based on conduction of Electricity. ❖ Uses symbols to 	<p>The Teacher will start the lesson with discussion to check for prior Knowledge, probing questions.</p> <p>Take your scale and rub on your dry hair. Then bring it near to the small piece of paper.</p> <ul style="list-style-type: none"> ● What do you observe in the movement of the paper? ● Why did it happen? <p>Balloon attracts the pieces of paper.</p> <ul style="list-style-type: none"> ● What are you observing in this picture? ● Why is the piece of paper attracted to the balloon? 	<ul style="list-style-type: none"> ● What is static current? 	<p>Byju's video : https://www.youtube.com/watch?v=pZi79r2unC8</p> 

represent various components in electric circuits

- Do balloons have super power?



Lightening :



- Have you ever noticed lightening in the sky?
- What have you noticed in it?

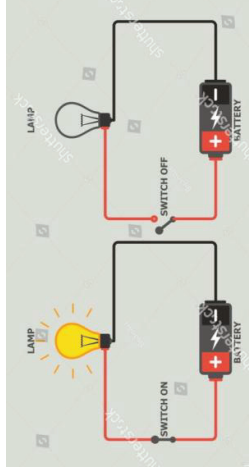
What kind of electricity lightning contains?

Which type of electricity flows in our homes?

What is a circuit?

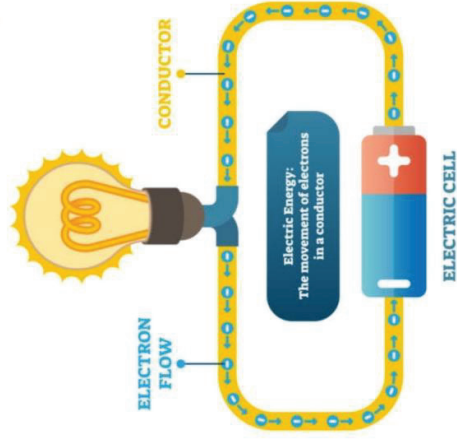
Components in a electric Circuit

- Why was it sparking?



Observe the pictures why does the bulb glow in the first picture. Give reason?

ELECTRIC ENERGY ⚡



ELECTRIC CURRENT

- What constitutes electricity?

Video showing the conventional direction of current.

https://www.youtube.com/watch?v=uWJ-B_EW4hE



- What is the SI unit of electric Charge?
- Define the unit of current?
- What does an electric current mean?

Symbol of Commonly used Components in circuit diagrams shown on IFP.

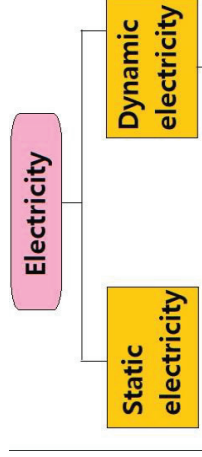
- Are you able to recall the electrons (electricity concept) in previous grade and in states of matter?

Absolutely! there is various kind of objects and material which consist with electrons. The combinations of electrons drive material to behave specifically.

Teacher will explain about it.

Let's look at this video.

https://www.youtube.com/watch?v=uWJ-B_EW4hE



- Do all substances conduct electricity?
- Have you ever seen an electrician uses a tester while working which have plastic grip at the top and metal at the bottom?

Table 11.1: Symbols for various electrical components

Symbol	Component
	Cell
	Battery
	Plug key
	Bulb
	Resistor
	Variable resistor
	Capacitor
	Inductor

- Calculate the number of electrons constituting one coulomb of charge?
- Name the instrument used to measure Electric current in a circuit and how it should be Connected?

- Write the relationship between net charges, time and current?

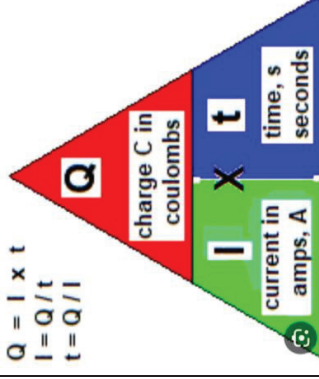
- A current of 0.5 A is drawn by filament of an electric bulb for 10 Minutes. Find the amount of electric charge that flows through the circuit.

- What are conductors and insulators?

$$Q = I \times t$$

$$I = Q / t$$

$$t = Q / I$$



	<div data-bbox="256 1178 461 1444"> <p>Materials</p> <ul style="list-style-type: none"> Conductors (Ex : Metals) Insulators (Ex : Wood, Paper) </div> <div data-bbox="526 995 1382 1528"> <p>Electrical Conductors vs Electrical Insulators</p> <p>Conductor allows the energy to pass through it.</p> <p>Insulator does not allow the energy to pass through it.</p> <table border="0"> <tr> <td>Silver</td> <td>Gold</td> <td>Glass</td> <td>Rubber</td> </tr> <tr> <td>Steel</td> <td>Copper</td> <td>Plastic</td> <td>Oil</td> </tr> <tr> <td>Sea Water</td> <td></td> <td></td> <td></td> </tr> </table> </div>	Silver	Gold	Glass	Rubber	Steel	Copper	Plastic	Oil	Sea Water				
Silver	Gold	Glass	Rubber											
Steel	Copper	Plastic	Oil											
Sea Water														
	<ul style="list-style-type: none"> • Make symbol of an electric cell, a wire joint? 													

Student recalls the definition of a circuit and its types.

Teacher will ask questions on the component of electric circuit to check the children knowledge on it.

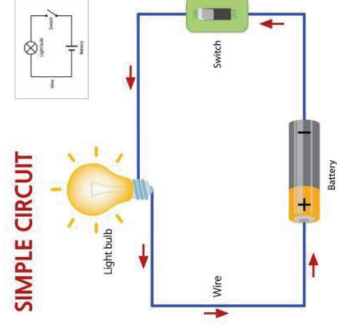
Table 11.1 Symbols of some commonly used components in circuit diagrams

Sl. No.	Components	Symbols
1	An electric cell	
2	A battery or a combination of cells	
3	Plug key or switch (open)	
4	Plug key or switch (closed)	
5	A wire joint	
6	Wires crossing without joining	

7	Electric bulb	
8	A resistor of resistance R	
9	Variable resistance or rheostat	
10	Ammeter	
11	Voltmeter	

Teacher explains about electric current is the ordered flow of charges in a circuit and derives its formula

- What is use of an electric cell, plug key?







Explain the direction of current and its formula, units of charge, electric current

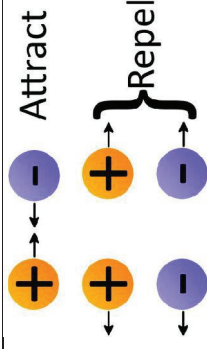
Teacher Reflections & Experience :

1. Did I clearly communicate the lesson objectives to the students?
2. How can I ensure that students understand the objectives and can demonstrate their knowledge or skills related to them?
3. Did I use effective instructional strategies to engage students in the lesson?

PERIOD PLAN - 2

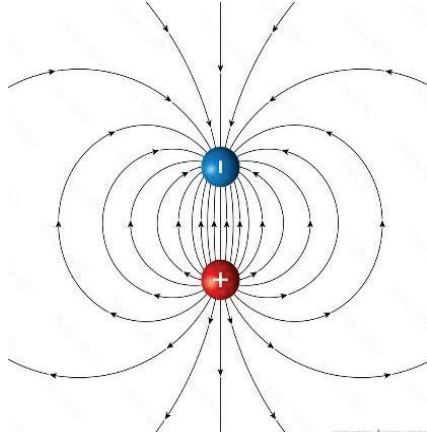
CLASS : X
CHAPTER : ELECTRICITY
TOTAL NO. OF PERIODS : 10
PERIOD NO : 2
TOPIC : ELECTRIC CURRENT AND CIRCUIT
KEY CONCEPTS : Potential, Potential difference, Voltmeter, Volt.

Learning Outcomes	Teaching Learning Process	Pointers for assessment.	Materials required
❖ Develops understanding about electric field, electric potential and potential difference and its units and defines them. ❖ Draw linkages about effect of Potential difference s cause for the ordered flow of charges in a conductor.	Teachers will ask questions to relate to the previous topic. <ul style="list-style-type: none"> • How many types of charges are there? • What happens when two like charges are brought together? <div style="display: flex; justify-content: center; gap: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <ul style="list-style-type: none"> • What happens when unlike charges are brought together? <div style="display: flex; justify-content: center; gap: 20px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	<ul style="list-style-type: none"> • What is Electric current? • What is formula for Electric current? 	



- Does the attraction or repulsion happen at any distance from the charge?
- What is region around a charges where its influence is felt?

Electric Field.




- Observe the following video and answer the following questions.

- What happens when two like poles of magnet are brought together?

- What is electric current?
- What makes Charges to Flow?

<https://www.youtube.com/watch?v=SNIOPxZ-Ev4>

	<p>https://www.youtube.com/watch?v=SNIOPxZ-Ev4</p> <ul style="list-style-type: none"> • What is cause for electric Charges to flow? • What is electric Potential energy? • What is potential difference? • How is the potential difference produced in a circuit? • What is the other Name of potential difference, work done and charge related? <p>Name the SI unit of potential difference.</p>	<ul style="list-style-type: none"> • What is the symbol for voltmeter? • Name the device that helps to maintain a potential difference across a conductor? • What is meant by potential difference between the points is 1 V? • Which instrument is used to measure the potential difference? • How do we connect the voltmeter in a circuit? • How much energy is given to each coulomb of charge passing through a 6V battery? 	
<p><u>Teacher Reflections & Experience :</u></p> <ol style="list-style-type: none"> 1. How can I improve the variety and effectiveness of my teaching methods to cater to different learning styles and needs? 2. How well did I manage the classroom during the lesson? 3. Were there any disruptions or behavioral issues that I need to address? 			

PERIOD PLAN - 3

CLASS	: X
CHAPTER	: ELECTRICITY
TOTAL NO. OF PERIODS	: 10
PERIOD NO	: 3
TOPIC	: ELECTRIC CURRENT AND CIRCUIT
KEY CONCEPTS	: Nichrome, Ammeter, voltmeter and resistance.

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT.	MATERIALS REQUIRED
<ul style="list-style-type: none"> ❖ Explores the physical world around them and understands scientific Principles and laws based on observation and analysis. ❖ Manipulates and analyses different characteristics of the circuit (current, voltage, resistance) and mathematics of their relationship(Ohm's law) ❖ Classifies materials around based on abeyance of Ohm's 	<p>Observe the below video. https://www.youtube.com/watch?v=oFTj9LWkmm8</p> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> ● Is there a relationship between the potential difference across a conductor and the current through it? <p>Let us explore with an activity.</p> <p>Activity 12.1 In 1827 German Physicist George Simon Ohm established a relationship between current I, flowing in a wire and potential</p>	<ul style="list-style-type: none"> ● Name the device used for measuring electric current? ● Name the device used for measuring potential difference? 	<p>Nichrome wire, ammeter, voltmeter and four cells of 1.5 V each.</p> <p>Byju's videos. https://www.youtube.com/watch?v=2hfSHErOce</p> <div style="text-align: center;">  </div>

law as Ohmic and Non – Ohmic conductors.

❖ conducts investigations and experiment to arrive at and verify to seek answers

to queries on their own.

❖ Verifies Ohm's law and analyses and interprets data and graphs.

❖ Draws v-I Graphs for Ohmic and Non – Ohmic conductors.

difference V between its ends.

$$V \propto I \text{ (At constant Temp)}$$

$$V/I = \text{Constant}$$

$$= R$$

$$V = IR$$

R. is constant – Resistance

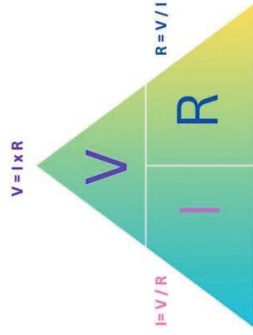


Diagram of Electric circuit for studying Ohm's law.

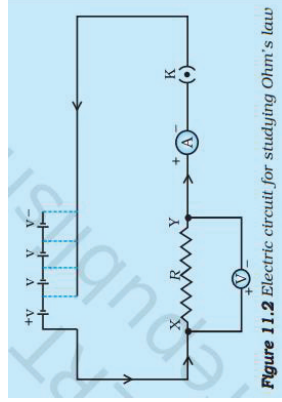


Figure 11.2 Electric circuit for studying Ohm's law

Define resistance? Write it's SI unit
 What is a resistor?
 Draw the symbol for resistor.
 How does a resistor and resistance differ?
 Video related to act – 12.2 current is different for different Components.

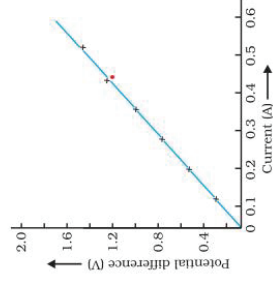
When a 12 V battery is connected across an unknown resistor, there is a current of 2.5 mA in the circuit. Find the value of resistance in the resistor.

S. No.	Number of cells used in the circuit (ampere)	Current through the nichrome wire, I (volt)	Potential difference across the nichrome	V/I (volt/ampere)
1	1			
2	2			
3	3			
4	4			

- Did you observe any change?
- In ammeter reading when we charge the no. of cells in the circuit are increased?
- Calculate the V/I ratio in each case. What do you observe?

$V/I = \text{Constant ratio}$

Plot the V-I Graph for the reading in the table.



What is the nature of the graph?

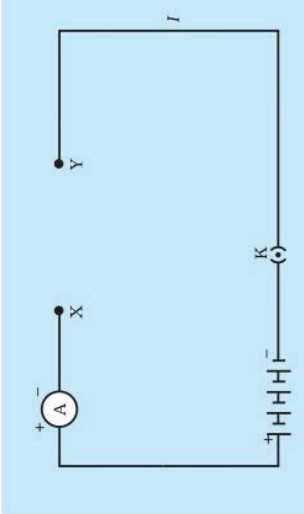

Q. A 10 ohms resistor is powered by a 5-V battery. The current flowing through the source is:

- A) 10 A
- B) 50 A
- C) 2 A
- D) 0.5 A

Q. An unknown resistor has 5 mA current flowing through it when 10 volts are applied to it. For the same resistor, the application of 20 volts will result in the current flow of:

- A) 2 mA
- B) 5 mA
- C) 10 mA
- D) 50 mA

<https://www.youtube.com/watch?v=FFHUoWFtab0>

	<p>Watch this video on the resistance.</p> <p>https://www.youtube.com/watch?v=FFHUoWFtab0</p> 		
<p><u>Teacher Reflections & Experience :</u></p> <ol style="list-style-type: none"> 1. How can I improve the variety and effectiveness of my teaching methods to cater to different learning styles and needs? 2. How well did I manage the classroom during the lesson? 3. Were there any disruptions or behavioral issues that I need to address? 			

PERIOD PLAN – 4

CHAPTER	: ELECTRICITY
TOTAL NO. OF PERIODS	: 10
PERIOD NO	: 4
TOPIC	: FACTORS ON WHICH THE RESISTANCE OF A CONDUCTOR DEPENDS.
KEY CONCEPTS	: RESISTIVITY, TUNGSTEN, CONDUCTORS AND INSULATORS.

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT.	MATERIALS REQUIRED
<ul style="list-style-type: none"> ❖ Analyses and draws conclusion about resistance depends on length of conductor, area of cross - section temperature and nature of material. ❖ Draws electric circuit diagram and study it. 	<p>https://www.youtube.com/watch?v=B4tIYHAJmrQ&pp=ygU2RmFjdG9ycyBvbiB3aGljaCB0aGUgcmlVzaXN0YW5jZSBvZiBhIGNvbmR1Y3RvcilicGVuZHMg</p> <div style="text-align: center;">  </div>		<p>Cell, a metal in nichrome wire of different length & Thickness connecting wires.</p> <p>Byju's videos : https://www.youtube.com/watch?v=M3fVNAIKGaM&pp=ygUccmVzaXN0b3JzIGluIHhcmFsbGVsICBieWp1cw3D3D</p> <div style="text-align: center;">  </div>
<p>Teachers perform Activities 12.3 and records the observation.</p>			

❖ Understand that resistivity of material is different for different materials.

❖ Resistivity varies with temperature.

Nature of material	Length of wire	Electric potential V	Electric current I	Resistance $R = V/I$

Repeat the activity with nichrome of different length and same thickness and record your observation instead of nichrome perform the activity with copper wire of different length and same area. And repeat the same activity with different area.

- Does the current depend on length of the conductor?
- Does the current depend on the area of cross – section of the wire used?
- Does the current vary with nature of the material?

We observe that

$$R \propto L$$

$$R \propto L/A$$

Combining 1 and 2

$$R \propto L/A$$

- What happens to the resistance when the length of the conductor of doubted?
- What are the various factors on which resistance of a conductor depend?

Material	Resistivity ($\Omega \text{ m}$)
Conductors	
Silver	1.60×10^{-8}
Copper	1.62×10^{-8}
Aluminium	2.82×10^{-8}
Tungsten	5.20×10^{-8}
Nickel	6.84×10^{-8}
Iron	10.0×10^{-8}
Chromium	12.9×10^{-8}
Manganese	84.0×10^{-8}
Constantan (alloy of Cu and Ni)	1.84×10^{-6}
Manganin (alloy of Cu, Mn and Ni)	44×10^{-8}
Nichrome (alloy of Ni, Cr, Mn and Fe)	100×10^{-8}
Insulators	
Glass	$10^{10} - 10^{14}$
Ebonite	$10^{10} - 10^{12}$
Hard rubber	$10^{10} - 10^{11}$
Amber	$10^{10} - 10^{11}$
Paper (dry)	$10^{10} - 10^{12}$

Use data in above table and answer the following.

A) Which among iron and mercury is a better conductor?

B) Which material is the best conductor?

- Why are the coils of electric toasters and electric irons made of an alloy rather than pure metal?

$R = \rho L/A$ SI unit of R is \square

P- Electric resistivity

SI unit \square M

Observes table 12.2 electrical resistivity of some substances at 20c

	Material	Resistivity ($\Omega \cdot m$)
Conductors	Silver	1.60×10^{-8}
	Copper	1.62×10^{-8}
	Aluminium	2.63×10^{-8}
	Tungsten	5.20×10^{-8}
	Nickel	6.84×10^{-8}
	Iron	10.0×10^{-8}
	Chromium	12.9×10^{-8}
	Mercury	94.0×10^{-8}
	Manganese	1.84×10^{-6}
	Constantan (alloy of Cu and Ni)	49×10^{-6}
Alloys	Manganin (alloy of Cu, Mn and Ni)	44×10^{-6}
	Nichrome (alloy of Ni, Cr, Mn and Fe)	100×10^{-6}
	Glass	$10^{10} - 10^{14}$
Insulators	Hard rubber	$10^{13} - 10^{16}$
	Ebonite	$10^{15} - 10^{17}$
	Diamond	$10^{12} - 10^{13}$
	Paper (dry)	10^{12}

Q. The resistance of a copper wire if it's length is 1 m and its diameter is 2 mm is

- A) $5.4 \times 10^{-3} \Omega$
- B) 5Ω
- C) 4Ω
- D) 2Ω

Q. The value of specific resistance depends upon

- A) length of wire
- B) area of cross section
- C) nature of conductor
- D) all of above

Q..A material B has twice the specific resistance of the material A. A circular wire made of B has twice the diameter of the wire made of A. Then , for the two wires to have to have the same resistance, the ratio L_a/L_b of their respective lengths must be

- (a) $1/2$
- (b) 2
- (c) $1/4$

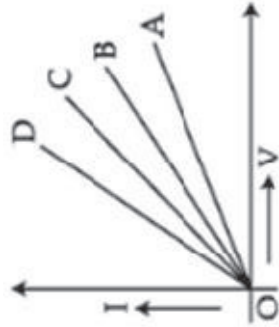
	(d)1	
<p><u>Teacher Reflections & Experience :</u></p> <ol style="list-style-type: none">1. What strategies can I implement to improve classroom management?2. Did the students actively participate and show interest in the lesson?3. How can I increase student engagement and create a more interactive learning environment		

PERIOD PLAN - 5

CLASS	: X				
CHAPTER	: ELECTRICITY				
TOTAL NO. OF PERIODS:	10				
PERIOD NO	: 5				
TOPIC	: NUMERICALS ON RESISTANCE $V = IR$				
KEY CONCEPTS	: RESISTANCE, RESISTIVITY, RESISTORS				

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT.	MATERIALS REQUIRED
<ul style="list-style-type: none"> ❖ Describe the relationship between V, I and R using ohm's law. ❖ Learn the formula $V = IR$ and SI units of physical quantities. ❖ Solve numericals 	<p>Let us solve the following numericals.</p> <p>Example 11.3 :</p> <p>(a) How much current will an electric bulb draw from a 220 V source, if the resistance of the bulb filament is 1200 Ω?</p> <p>Solution :</p> <p>(a) We are given $V = 220$ V; $R = 1200$ Ω. From Eq. (12.6), we have the current $I = 220$ V/1200 $\Omega = 0.18$ A.</p> <p>(b) How much current will an electric heater coil draw from a 220 V source, if the resistance of the heater coil is 100 Ω?</p> <p>(c) We are given, $V = 220$ V, $R = 100$ Ω. From Eq. (11.6), we have the current $I = 220$ V/100 $\Omega = 2.2$ A.</p>	<p>Q. Why is Ohm's law valid only for a constant temperature?</p> <p>A) A potential difference of a battery decreases with a rise in temperature</p> <p>B) A potential difference of a battery increases with a rise in temperature</p> <p>C) The electrical resistance of a battery decreases with a rise in</p>	

	<p>Note the difference of current drawn by an electric bulb and electric heater from the same 220 V source</p> <p>Example 11.5 :</p> <p>✓ Resistance of a metal wire of length 1 m is 26 Ω at 20°C. If the diameter of the wire is 0.3 mm, what will be the resistivity of the metal at that temperature?</p> <p>Solution :</p> <p>Given : the resistance R of the wire = 26 Ω, the diameter d = 0.3 mm = 3 × 10⁻⁴ m, and the length l of the wire = 1 m.</p> <p>Therefore,</p> <p>the resistivity of the given metallic wire is</p> $R = \frac{\rho l}{A}$ $\rho = \frac{RA}{l}$ $\rho = \frac{R\pi d^2}{4l}$ <p>ρ = (RA/l) = (Rπd²/4l)</p> <p>Substitution of values in this gives</p>	<p>temperature</p> <p>D)The electrical resistance of a battery increases with a rise in temperature</p> <p>Q.If there is a drop of IR across a given resistor, it is inferred that the resistor has experienced a change in potential. Does this potential change affect the current as well?</p> <p>R. Let the resistance of an electrical component remains constant while the potential difference across the two ends of the component decreases to half of its former value. What change will occur in the current through it?</p> <p>Q.A resistance wire is stretched so as to double its length. Its new resistivity will have a magnitude</p> <p>a. 2 times its original value b. 4 times its original value</p>	
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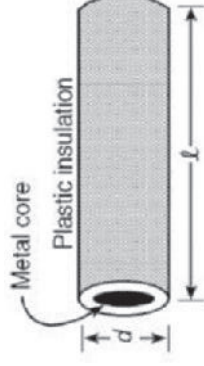
	<p>$\rho = 1.84 \times 10^{-6} \Omega \text{ m}$</p> <p>The resistivity of the metal at 20°C is $1.84 \times 10^{-6} \Omega \text{ m}$.</p> <p>Example 11.6 A wire of given material having length l and area of cross-section A has a resistance of 4Ω. What would be the resistance of another wire of the same material having length $l/2$ and area of cross-section $2A$?</p> <p>Solution : Case 1 : For first wire Length = l Area = A Resistance (R_1) = 4Ω $R_1 = \rho \frac{l}{A}$ (1) = 4Ω</p> <p>Case 2 : Now for second wire Length = $l/2$ Area = $2A$ Resistance (R_2) = ? $R_2 = \rho \frac{l}{A}$</p> $R_2 = \rho \frac{l}{2 \cdot 2A}$ $R_2 = \frac{1}{4} \left(\rho \frac{l}{A} \right)$ $R_2 = \frac{1}{4} R_1$	<p>c. 8 times its original value</p> <p>d. Same as its original</p> <p>Q. Study the V-I graph for four conductors A, B, C, and D having resistance R_A, R_B, R_C, and R_D respectively and which one of the following relations is true for these conductors.</p>  <p>a. $R_A > R_B > R_C > R_D$</p> <p>b. $R_A < R_B < R_C < R_D$</p> <p>c. $R_A = R_B = R_C = R_D$</p> <p>d. $R_A = R_B < R_C < R_D$</p> <p>Q. Plastic insulation surrounds a wire having</p>	
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$$R_2 = \frac{1}{4} 4\Omega$$

$$R_2 = 1\Omega$$

The resistance of the new wire is 1Ω

diameter d and length l as shown below.



A decrease in the resistance of the wire would be produced by an increase in the:


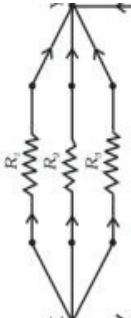
- Length l of the wire
- Diameter d of the wire
- Temperature of the wire
- Thickness of the plastic insulation

Teacher Reflections & Experience :

1. Did I assess student understanding effectively during the lesson?
2. Did I provide timely and constructive feedback to guide their learning?
3. How can I improve my assessment and feedback practices?

PERIOD PLAN - 6

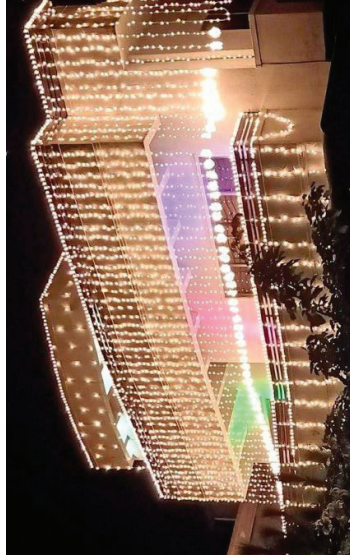
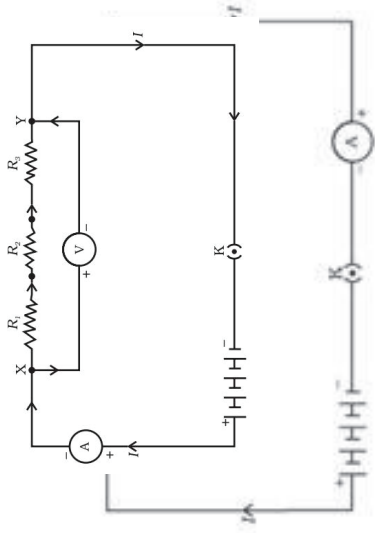
CLASS	: X							
CHAPTER	: ELECTRICITY							
TOTAL NO. OF PERIODS	: 10							
PERIOD NO	: 6							
TOPIC	: SYSTEM OF RESISTORS- SERIES CONNECTIONS							
KEY CONCEPTS	: SERIES, RESISTOR, AMMETER AND VOLT METER							

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT.	MATERIALS REQUIRED
<p>❖ Identifies resistors when connected end to end, resistance of the circuit increases.</p>	<p>Observe the following</p>	<p>✓ Have you observed any difference between the two pictures?</p> <div style="text-align: center;">  </div> <p>✓ Which kind of connection is this?</p> <div style="text-align: center;">  </div> <p>✓ Which kind of connection is this?</p>	<p>3 resistors, ammeter, voltmeter, plug key, 6 volt battery, connecting wires.</p> <p style="text-align: center;"><u>Video</u></p> <p>https://www.youtube.com/watch?v=e0gZvBR7RtE&pp=ygUhcmVzaXN0b3JzIGIuIHNIcmllcyA3YWNPdHZlc3R1ZG9c</p>



- ✓ What do you think, are these connections being used in daily life or not?
- ✓ If yes, mention a few examples.
- ✓ Which device is used for measuring current?
- ✓ How do we connect the ammeter in the circuit?
- ✓ Name the device used for measuring potential difference?


- ✓ Draw a schematic diagram of a circuit consisting of a battery of three cells of 2 V each, a $5\ \Omega$ resistor, an $8\ \Omega$ resistor, and a plug key, all connected in series.



Watch this video.

<https://www.youtube.com/watch?v=e0gZvBR7RtE&pp=ygUhcmlldyA3YWNpdHZlc3R1ZG9c>

- ❖ Draws a circuit diagram for the resistors connected in series.

<p>❖ Analysis and solve numericals on their own.</p>	 <p>Activity 11.4 :</p> <ul style="list-style-type: none"> ✓ We observe that the value of current in the ammeter is the same, independent of its position in the circuit. ✓ In series combinations of resistors, the current is same in every part of the circuit or same current in each resistor. <p>Activity 11.5 :</p> <ul style="list-style-type: none"> ✓ Resistors in series. ✓ Teacher will derive the formula for resistors connected in series. <p>Teacher will ask the following questions while deriving.</p> <ul style="list-style-type: none"> ✓ Which quantity remains constant across the three resistors arranged in series combination? ✓ Which quantity changes when we arrange the resistors in series? 	<ul style="list-style-type: none"> ✓ Can we connect a bulb and heater in series? <p>Q. Two resistors having values 18 ohms and 50 ohms are connected in series to an unknown source. An ammeter is connected to the circuit which reads 2 A. Find the input voltage to the circuit:</p> <p>A)36 V B)100 V C)136 V D)168 V</p> <p>Q. Identify the combination which is not a series connection.</p> <p>a) Resistance box b) Decorative bulbs c) Fuses d) Domestic appliances</p> <p>Q. Two wires of the same material have the same length but their radii are in</p>	
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	<ul style="list-style-type: none"> ✓ What is the potential difference across resistors R1, R2 and R3? ✓ How do we find the total potential in the circuit? ✓ Teacher will derive the formula and answer of these questions. 	<p>the ratio of 5:3. They are combined in series, where the resistance of the thicker wire is 12 ohms. Calculate the total resistance of the combination in ohms</p> <p>a) 40 b) 12 c) 32 d) 20</p>	
<p><u>Teacher Reflections & Experience :</u></p> <ol style="list-style-type: none"> 1. What were my strengths during the lesson? 2. In what areas can I improve as a teacher? 3. How can I continue to develop my teaching skills and practices? 			

PERIOD PLAN - 7

CLASS	: X		
CHAPTER	: ELECTRICITY		
TOTAL NO. OF PERIODS	: 10		
PERIOD NO	: 7		
TOPIC	: RESISTORS IN PARALLEL		
KEY CONCEPTS	: PARALLEL, RESISTOR, AMMETER AND VOLTMETER		

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT.	MATERIALS REQUIRED
<ul style="list-style-type: none"> ✓ Identify when resistors are connected in parallel, the total resistance of the circuit decreases. ✓ Draw the circuit diagram for resistors connected in parallel. ✓ Analyze and solve numericals independently. 	<p>Teacher will pose a few questions based on the previous class.</p> <ul style="list-style-type: none"> ✓ What are the disadvantages of series connections? <p>Let us perform the following activity 11.6 to know about resistors connected in parallel.</p> <p>https://www.youtube.com/watch?v=BbYtMQ8EYBg&pp=ygUUVcmVzaXN0b3JzIGluIHBlcmFsbGVz</p>	<ul style="list-style-type: none"> ✓ What is the effective resistance of resistors 2Ω, 3Ω, 5Ω connected in series. ✓ Where do we find series connections in our day to day life? 	<p>Three resistors, battery, plug key, ammeter, voltmeter, 6V battery and connecting wires.</p> <p>https://www.youtube.com/watch?v=BbYtMQ8EYBg&pp=ygUUVcmVzaXN0b3JzIGluIHBlcmFsbGVz</p> 
<ul style="list-style-type: none"> ✓ Analyze and solve numericals independently. 	<p>Let us perform the following activity 11.6 to know about resistors connected in parallel.</p> <p>https://www.youtube.com/watch?v=BbYtMQ8EYBg&pp=ygUUVcmVzaXN0b3JzIGluIHBlcmFsbGVz</p>	<ul style="list-style-type: none"> ✓ Where do we find series connections in our day to day life? 	<p>Three resistors, battery, plug key, ammeter, voltmeter, 6V battery and connecting wires.</p> <p>https://www.youtube.com/watch?v=BbYtMQ8EYBg&pp=ygUUVcmVzaXN0b3JzIGluIHBlcmFsbGVz</p> 

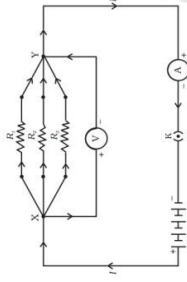


Figure 11.7 Resistors in parallel

- ✓ How many ways does the current have at point x?
- ✓ In parallel connection, which quantity gets divided?
- ✓ What is the formula for ohm's law?
- ✓ Which resistor is having the least resistance in the given problem?
- ✓ What was effective resistance of resistors in the given problem?
- ✓ What did you notice in the above two questions?

✓ What is the formula for finding effective resistance for a group of resistors R1, R2 and R3 connected in parallel?

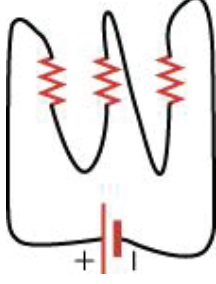
✓ What is the effective resistance of resistors 2Ω , 3Ω , 5Ω connected in parallel?

✓ What is the advantage of having household connections in parallel than series?
 .Q.A $10\text{-}\Omega$ resistor is connected in parallel to another resistor R . The equivalent resistance of the pair is $8\ \Omega$. What is the resistance R?

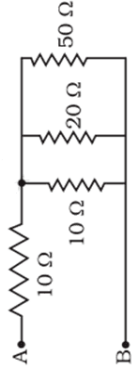
1. $10\ \Omega$
2. $20\ \Omega$
3. $30\ \Omega$

4. 40Ω

Q. Are the resistors shown connected in parallel or in series? Explain.




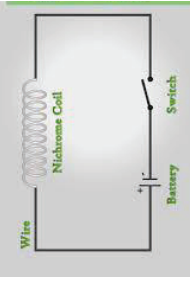

1. The resistors are connected in parallel because the same current flows through all three resistors.
2. The resistors are connected in parallel because different current flows through all three resistors.
3. The resistors are connected in series because the same current flows through all three resistors.
4. The resistors are connected in series because different

		<p>current flows through all three resistors.</p> <p>Q. The resistance between A and B in the given figure will be</p>  <p> a. $20\ \Omega$ b. $30\ \Omega$ c. $90\ \Omega$ d. More than $10\ \Omega$ but less than $20\ \Omega$ </p>
<p><u>Teacher Reflections & Experience :</u></p> <ol style="list-style-type: none"> 1. Did I encourage self-reflection and meta cognition among students? 2. How can I incorporate more opportunities for students to reflect on their learning and assess their own progress? 3. Did I critically examine student work to gain insights into their understanding and identify areas for improvement? 		

PERIOD PLAN - 8

CLASS	: X						
CHAPTER	: ELECTRICITY						
TOTAL NO. OF PERIODS	: 10						
PERIOD NO	: 8						
TOPIC	: HEATING EFFECT OF ELECTRIC CURRENT & ITS PRACTICAL APPLICATIONS.						
KEY CONCEPTS	: HEATING EFFECT OF ELECTRICITY AND ITS APPLICATIONS.						

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT.	MATERIALS REQUIRED
<ul style="list-style-type: none"> ❖ Explain and calculate the heating effect of electric current, in order to learn working of appliances like heater and iron ❖ uses appropriate electrical plugs and fuses (5 /15A) for different electrical devices. 	<p>Introductory Activity:</p> <p>Teacher demonstrates a simple activity using a battery, connecting wires and Nichrome wire in the class room.</p> <p>Teacher asks a student to touch the coil slowly</p> <p>✓ What do you notice or feel ?</p> <p>(Showing an Iron Box and water Heater on IFP or Physical teacher may ask questions)</p> <p>✓ What are the uses of these home appliances?</p> <p>✓ What is the purpose of a Geyser ?</p>	<p>✓ The mechanism of heat produced in a conductor when an electric current flows through it can be explained on the basis of...</p> <p>A)Viscosity</p> <p>B)Friction</p> <p>C)Free electron theory</p> <p>D)Gauss's theorem</p> <p>✓ Two heating coils ,one of fine wire and the other of thick wire of the same material and of the same length are connected in series and in parallel.</p>	<p>Cell/Battery, connecting wires, Nichrome coil, Switch.</p> 

	<p>we use these home appliances for our house hold purposes.</p> <ul style="list-style-type: none"> ✓ Can we use these gadgets without connecting them to electricity? <p>Teacher by Showing the Battery/Cell in the circuit and ask the purpose of battery in the circuit.</p> <ul style="list-style-type: none"> ✓ Why is it needed to maintain Potential difference across the terminal of a battery/cell? ✓ What is required to the battery/cell to maintain current in the circuit? ✓ Where does this energy goes? ✓ What happens if the gadget is purely resistive? <p>Statement :</p> <p>When an electric current passes through a conductor (like high resistance wire) the conductor becomes hot after some time and produces heat.</p> <p>This is called heating effect of electric current.</p> <p>This effect is utilized in devices such as electric heater, electric iron box etc..</p>	<p>Which of the following statement is correct.</p> <ul style="list-style-type: none"> A) In series fine wire liberates more energy while in parallel thick wire will liberate more energy B) In series fine wire liberates less energy while in parallel thick wire will liberate more energy C) Both will liberate equally D) In series the thick wire will liberate more while in parallel it will liberate less energy 	 <p>Electric Iron Box, Electric Water Heater</p> 
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Let us derive an expression for this heat energy so generated during the flow of current.

Derivation : Consider a current 'I' flowing through a resistor 'R'.

Let the Potential difference across the resistor be 'V'. Let 't' be the time during which, charge 'Q' flow across it.

The work done in moving a charge 'Q' through a potential difference 'V'

$$W = VQ$$

Therefore, the source must supply energy equal to VQ in time 't'.

Power input to the circuit by the Source

$$P = \frac{W}{t}$$

$$= \frac{VQ}{t}$$

$$= V \left(\frac{Q}{t} \right)$$

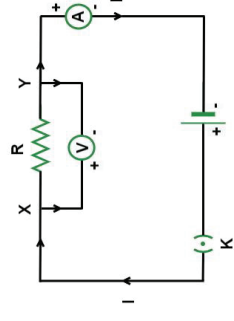
$$P = VI \quad (\text{since } \frac{Q}{t} = I)$$

But the energy supplied to the circuit by the source in time 't'

$$= P \times t$$

$$= VIt$$

This energy gets dissipated in resistance



Heating effects of Electricity video link :

<https://youtu.be/neEvi0AFk cA?si=X-Ayl cFP7x7Pimy>

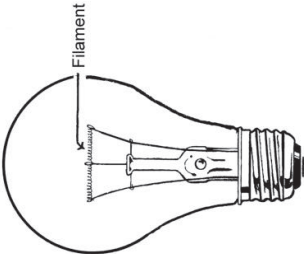




✓ A constant voltage is applied between the two ends of a metallic wire. If both the length and the radius of the wire are doubled, the rate of heat developed in the wire will be

- A) doubled
- B) halved
- C) remain the same
- D) quadrupled

✓ An electric geyser consumes electricity at the rate of 1000W. If the potential difference through the electric

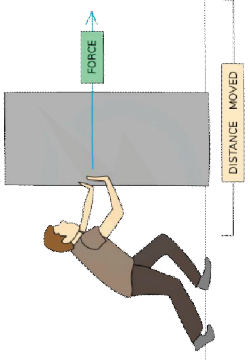
	<p>as heat (H) Thus we can write $H = VIt$</p> <p>We know from ohm's law that $V = IR$</p> <p>So, we can write $H = (IR) It$</p> <p>$H = I^2Rt$</p> <p>The above expression is known as Joule's Law of heating.</p> <p>We can say from the joule's law of heating that ,</p> <p>Heat produced in a resistor is</p> <p>(I) Directly proportional to the square of the current passing through a given resistance</p> <p>(II) Directly proportional to resistance for a given time</p> <p>(III) Directly proportional to the time for which the current flows through the resistor.</p> <p>✓ Is increasing of heat in electric circuit always useful?</p> <p>✓ Is the heating effect of electricity useful in our daily life?</p> <p>Give some more examples other than we discussed earlier.</p>	<p>circuit is 250 V, find the resistance offered by geyser and electric current through the circuit.</p> <p>✓ How much more heat is produced, if current is doubled?</p> <p>(a) twice the original amount</p> <p>(b) thrice the original amount</p> <p>(c) four times the original amount.</p> <p>(d) five times the original amount.</p> <p>✓ A bulb has a resistance of 5Ω. If 2 A of current at 200 V flows through the bulb, how much heat is produced by the bulb in 10 minutes?</p> <p>(a) $2.0 \times 10^5 \text{ J}$</p> <p>(b) $4.0 \times 10^5 \text{ J}$</p> <p>(c) $1.2 \times 10^6 \text{ J}$</p> <p>(d) $2.4 \times 10^6 \text{ J}$</p> <p>✓ What is the purpose of FUSE in utilizing it in the circuits or house hold appliances?</p> <p>✓ What happen if we use Tungsten as Fuse wire?</p>	<p>Electric bulb, connecting wires, battery/ power</p>
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	<p>Let us know few more applications.</p> <ul style="list-style-type: none"> ✓ Have you observed a glowing bulb? ✓ Where does the light coming from? ✓ Why the filament not melted due to the heating effect of electricity even when current is flowing through it for long time? ✓ Heating effect of electricity can also be used for other purposes just like light from bulb. ✓ For this purpose the filament used as heating element is to be chosen such that it should retain the heat to become very hot and emit light without melting at high temperature. ✓ Do you know which metal is used for making such filaments? ✓ Tungsten is used to make filaments of bulbs as it has high melting point (3380°C) and high resistivity. ✓ Most of the power consumed by the filament appears as heat but small part of it is in the form of light radiated. ✓ Another common application of Joule's heating effect is FUSE used in circuits . 	<ul style="list-style-type: none"> ✓ Do all home appliance will have same type of Fuses? ✓ An electric heater of resistance $10\ \Omega$ connected to $220\ V$ power supply is immersed in the water of $1\ kg$. How long the electrical heater has to be switched on to increase its temperature from $30^\circ C$ to $60^\circ C$. (The specific heat of water is $s = 4200\ J/kg-1$) ✓ How heating effect of electricity useful to us. Justify? 	<p>supply.</p> 
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	<ul style="list-style-type: none"> ✓ What is the quality of material to be used for the purpose of fuse? ✓ When a high current pass through the fuse which is connected to the gadget will melt and there by protect the gadget from entering a high current into it? <p>Different appliances will have different values of Fuses depends upon the Power they consumed and operated Voltage.</p> <p>For example, electric Iron consumes 1KW electric power when operated at 220V.</p> <p>Current $I = 1000/220 = 4.54A$ In this case a 5A fuse must be used.</p>		
<p><u>Teacher Reflections & Experience :</u></p> <ol style="list-style-type: none"> 1. How can I use student work as a valuable source of information for my teaching? 2. Did I effectively utilize formative assessments to monitor student progress and adjust instruction accordingly? 3. How can I further integrate assessment for learning strategies into my teaching practice? 			

PERIOD PLAN - 9

CLASS : X
CHAPTER : ELECTRICITY
TOTAL NO. OF PERIODS : 10
PERIOD NO : 9
TOPIC : ELECTRIC POWER.
KEY CONCEPTS : HEATING EFFECTS OF ELECTRICITY AND ITS APPLICATIONS.

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT	MATERIALS REQUIRED
<ul style="list-style-type: none"> ❖ Calculate power , in order to represent electric consumption in domestic circuits. ❖ Uses scientific conventions to represent units of various quantities. 	<p>Introductory activity(5 min)</p> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> ✓ What is the man doing in the picture? ✓ Is there any movement of the block? ✓ Define Work ? ✓ What is power? ✓ Can we define Power in case of Energy? ✓ What is the mathematical form of Joule's Law of Heating ? ✓ ($H = I^2Rt$) ✓ What is the formula for Power of Source ? 	<p>What is the relation between power, potential and current?</p>	

	<p>($P = VI$)</p> <p>$\Rightarrow P = I^2R$ ($V=IR$ from Ohm's Law) $P = \frac{V^2}{R}$</p> <p>Definition: The rate at which electric energy is dissipated or consumed in an electric circuit is known as electric power. If $V= 1$ volt and $I = 1$ ampere then Power = 1 Watt. 1 Watt = 1 volt x 1 amp</p> <p>Watt : The Power consumed by a device is said to be 1 Watt if it carries a current of 1 ampere operated between 1 volt.</p> <p>Do you know the unit for current consumption in our houses?</p> <p>How many watts is equal to 1 Kilo Watt ? (1 KW = 1000W)</p> <p>Since electrical energy is product of Power and Time, the unit of electrical energy is Watt-hour(W/h)</p> <ul style="list-style-type: none"> ● One Watt- hour is the energy consumed when 1 watt of power is is used for 1 hour. ● The commercial unit of electrical energy is Kilo Watt hour(KWh) commonly known as UNIT in 	<p>Problems:</p> <ul style="list-style-type: none"> ✓ An electric bulb is connected to a 220V generator.The current is 0.50A.What is the power of the bulb? ✓ An electric refrigerator rated 400 W operates 8 hour/day.What is the cost of the energy to operate it for 30days at Rs.3.00 per KWh? ✓ Find the cost of electricity consumed on an electric heater of 1500W which is used for 3 hours daily in the month of November. Given that the cost of electricity is Rs 4 per unit. <p>a) 600 b) 540 c) 650 d)900</p>	
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	<p>electricity bills.</p> <p>1 KWh = 1000Watt x 3600 second = 3.6×10^6 Watt -Second 1 KWh = 3.6×10^6 Joule.</p> <p>From</p> <p>(P x t = W, Watt x Second = Joule)</p> <ul style="list-style-type: none"> ● Teacher will explain some problems recapitulate the concepts in electricity 		
<p><u>Teacher Reflections & Experience :</u></p> <ol style="list-style-type: none"> 1. Did I clearly communicate the lesson objectives to the students? 2. How can I ensure that students understand the objectives and can demonstrate their knowledge or skills related to them? 3. Did I use effective instructional strategies to engage students in the lesson? 			

WORKSHEET-1

1. Match the following

Physical Quantity	Units
1. Resistance	A. Volt
2. Current	B. Ohm
3. Potential	C. Ampere

2. Which of the following terms does not represent electrical power in a circuit?
- I^2R
 - IR^2
 - V^2/R
 - VI
3. A battery of 4V is connected across an unknown resistor, there is a current of 5A in the circuit. Find the value of resistance of the resistor?
4. Which uses more energy: a 250W TV set in 1 hour or a 1200W toaster in 10 minutes?
5. Explain the following-
- Why is tungsten used almost exclusively for filament of electric lamps?
 - Why is the series arrangement not used for domestic circuits?

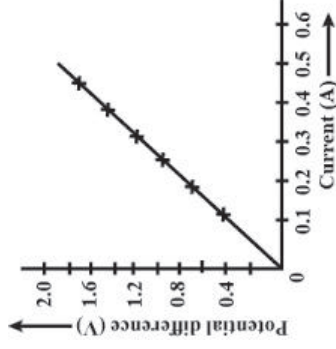
6. Show how you would connect three resistors, each of resistance 6Ω so that the combination has a resistance of
- 9Ω
 - 4Ω
7. What is the commercial unit of electrical energy? How is it related to joule?
8. Effective resistance of resistors in series is _____.
- $1/R_1+1/R_2$
 - $(R_1R_2+R_2R_1)/(R_1+R_2)$
 - $R= R_1+R_2$
 - None
9. Assertion: Potential difference is also called voltage.

Reason: Potential difference is measured using a voltmeter.

- Assertion is correct.
 - Reason is correct
 - Both assertion and reason are correct
 - Assertion is correct and the reason is wrong.
10. Specific resistance depends upon _____
- Temperature.
 - Nature of material
 - Both A and B
 - Length of material.

WORKSHEET-2

1. At the time of short circuit, the electric current in the circuit ? 1M
a) Vary continuously b) does not change c) Reduces substantially d) decreases heavily
2. Two bulbs of 100w and 40w are connected in series. The current through the 100w bulb is 1A. The current through the 40w bulb will be ? 1M
a) 0.4 A b) 0.6 A c) 0.8 A d) 1 A
3. The maximum resistance which can be made using four resistors each of $2\ \Omega$ is 1M
a) $2\ \Omega$ b) $4\ \Omega$ c) $8\ \Omega$ d) $16\ \Omega$
4. State Ohm's Law? How is an ammeter connected in an electric circuit? 2M
5. A $V - I$ graph for a nichrome wire is given below. What do you infer from the graph? Draw a labelled circuit diagram to obtain a graph ? 3M



6. (i) State with reasons the mode of connecting all electrical appliances in common domestic circuits?
(ii) Which two separate circuits are often used in domestic Electric circuits and why?
(iii) When does an electric short circuit occur? How can it be prevented? 5M
7. Two identical resistors each of resistance 15Ω are connected in (i) Series (ii) Parallel in turn to a battery of 6 V. Calculate the ratio of the power consumed in the combination of Resistors in each case. 5M
8. Write the mathematical expression for Joule's law of heating. 2M

E content of this lesson -Electricity

<https://www.youtube.com/watch?v=pZi79r2unC8>

https://www.youtube.com/watch?v=uWJ-J-B_EW4hE

<https://www.youtube.com/watch?v=SNIOPxZ-Ev4>

<https://www.youtube.com/watch?v=oFTj9LWkmm8>

<https://www.youtube.com/watch?v=2htSHErOces>

<https://www.youtube.com/watch?v=FFHUoWFtab0>

<https://www.youtube.com/watch?v=B4tIYHAJmrQ&pp=ygU2RmFjdG9ycyBvbiB3aGljaCB0aGUgcmlvZaXN0YW5jZSBvZiBhIGNvbmlR1Y3RvciBlcGVuZHMq>

<https://www.youtube.com/watch?v=M3fWNAIKGaM&pp=ygUccmVzaXN0b3JzIGluIHhcmFsbGVsICBieWp1cw3D3D>

<https://www.youtube.com/watch?v=e0gZvBR7RtE&pp=ygUhcmlvZaXN0b3JzIGluIHNIcmllcyA3YWVpdHZlcnR1ZG9c>

<https://www.youtube.com/watch?v=BbYtMQ8EYBq&pp=ygUVcmVzaXN0b3JzIGluIHhcmFsbGVs>

https://youtu.be/neEvi0AFkca?si=X-Ayl_cFP7x7Pimy

Lesson Number and Name:		11--ELECTRICITY							
Sl. No.	QUALITY PARAMETERS	No. of Periods:						Total	Remarks
		5	4	3	2	1	0		
		POINTS							
1	Are there adequate no. of period plans developed for the transacting the complete unit?	5							
2	Is the content of the total Unit plan well distributed across all the period plans?	5							
3	Is the time budgeted in the lesson plan adequate to complete all the activities and explanations?		4						
4	Is the language of the period plans easy, simple to understand and follow by anyone who reads it?	5							
5	Does the period plan have well-articulated outcomes or indicators with actionable verbs?	5							
6	Are the competencies and learning outcomes indicated for each lesson plan matching with the content?		4						
7	Is the lesson plan well sequenced - moving from simple tasks to more complex ones?	5							
8	Are there a variety of strategies suggested to transact the lesson? (The entire period plan is NOT carried out in the lecture method alone)		4						
9	Is there adequate scope in the plan for children to apply their learnings?		4						
10	Are the TLM suggested in the lesson plan relevant for the topic and easy to source?	5							
11	Wherever content is used from the textbook, is there proper referencing to page nos.; section heading etc.		4						
12	Is there variety in the assessment tools or techniques used across the lesson plans for the complete Unit?								
12.1.	Variety in forms of assessments								

9+1=10

CHAPTER – 12



MAGNETIC EFFECTS OF ELECTRIC CURRENT

Aims of Education :

- ❖ Rational Thought and independent thinking.
- ❖ Democratic & Community Participation.

Aims of science related magnetic effects of electric current :

- ❖ Scientific understanding of the natural and physical world.
- ❖ Capacities for scientific inquiry.
- ❖ Understanding the evolution of scientific knowledge.
- ❖ Understanding the relation between science, technology and society.
- ❖ Inter disciplinary understanding between science and other curricular areas.
- ❖ Magnetic field strength, at different points around it.

Curricular Goals(CG)& competencies(C) :

CG : Explores the physical world around them, and understands scientific principles and laws based on observations and analysis.

Competencies :

- ❖ Applies Oersted experiment principle in electromagnets, motors, dynamos, transformers.
- ❖ Explains the relationship between electric current & Magnetic field .
- ❖ Draws magnetic field lines for a bar magnet in order to identify magnetic field strength at different points around a magnet.
- ❖ Analyze the significance of neutral, earth and line wire in order to understand formation of domestic electrical Circuit.
- ❖ State and define right hand rule and Fleming's left hand rule in order to know the direction of magnetic field and force acting on current carrying conductor.

CG : Draws linkage between scientific knowledge and knowledge across other curricular areas.

Competencies :

- ❖ Applies the scientific principles to explain phenomena in other subjects (MRI in medical sciences)

CG : Explores the nature of science by doing science.

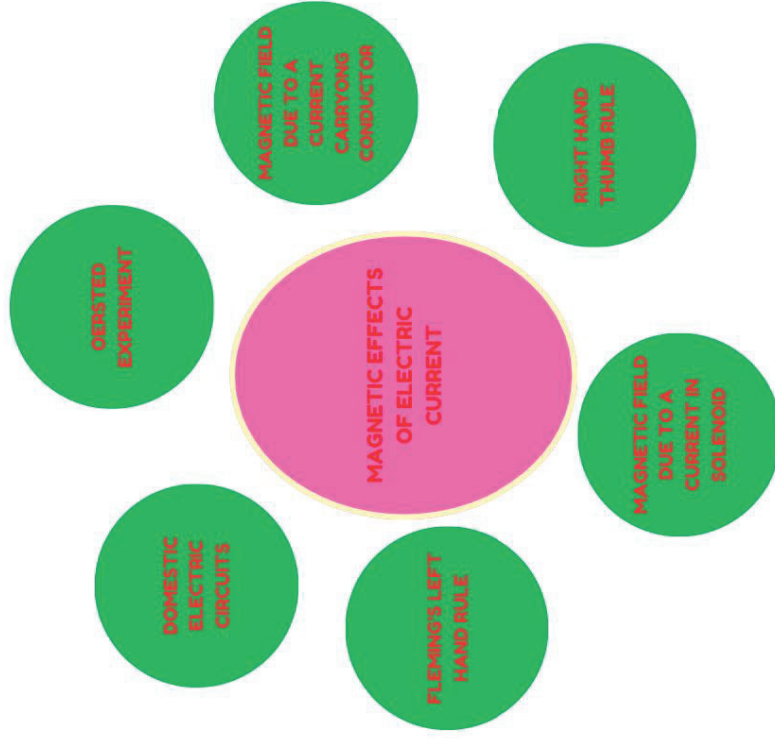
Competencies:

- ❖ Designs and plan for scientific inquiry. Draws inferences based on the data & understanding of scientific concepts, theories, laws & principles.

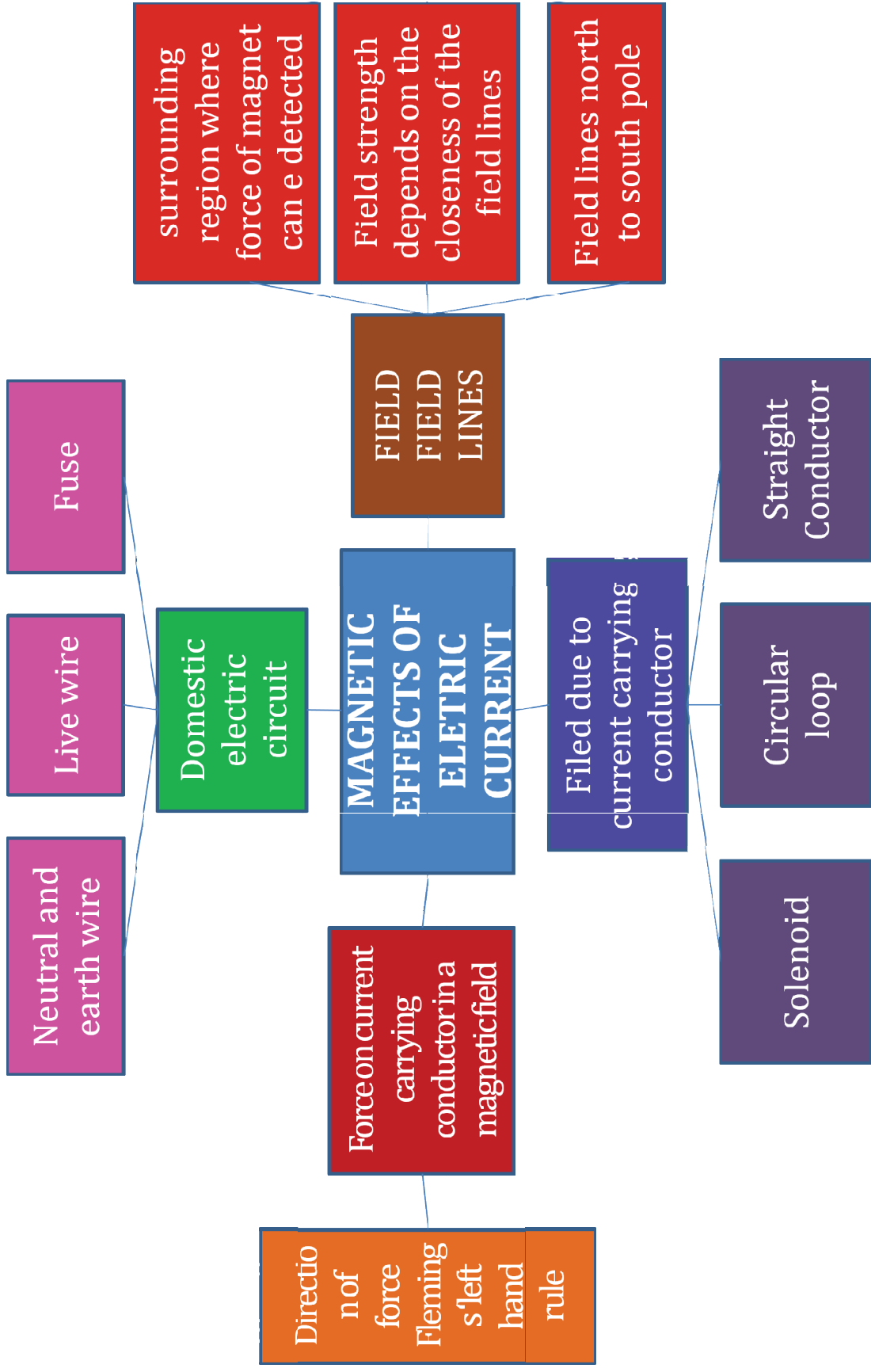
PERIOD NO.	TOPIC	LEARNING OUTCOME
1	<p>Activity (12.1) (Oersted experiment) Magnetic Field & Field lines. (12.2 Activity)</p>	<ul style="list-style-type: none"> ❖ Relates processes and phenomena with cause / effects such as deflection of compass needle due to magnetic effect of electric current. ❖ Describes the contribution of Oersted in the field of electricity and magnetism.
2	<p>Activity (12.3) (Field lines around a bar magnet) , 12.2 Magnetic Field due to a current carrying conductor.</p>	<ul style="list-style-type: none"> ❖ Draws magnetic field lines for a bar magnet, in order to identify the magnetic field strength at different points around a magnet ❖ Describes magnetic field & field lines.
3	<p>Magnetic field due to a current through a straight conductor, Right-Hand thumb Rule.</p>	<ul style="list-style-type: none"> ❖ Represent magnetic field lines for a straight current carrying conductor, in order to identify the magnetic field strength at different points around it. ❖ Takes initiative to know about scientific discoveries / inventions, such as Maxwell discovery that electricity and magnetism are related. ❖ Explains the direction of the magnetic field associated with a current carrying conductor through Right Hand Thumb rule.
4	<p>Magnetic field due to a current through a circular loop, magnetic field due to a current in a solenoid.</p>	<ul style="list-style-type: none"> ❖ Relates and draws magnetic field lines for current carrying circular loop in order to identify the magnetic field strength at different points around it as well as solenoid.

		<ul style="list-style-type: none"> ❖ Demonstrate magnetic field due to a current through a circular loop. ❖ Analyses the magnetic field pattern around a solenoid carrying current. ❖ Explains Fleming's Left Hand Rule in order to understand the working of electric motor, generator, loud speaker etc. ❖ Analyses the factors that depends on the force acting current carrying conductor in a magnetic field. ❖ Exhibits creativity in designing and model using eco-friendly resources such as working model of electric motor & generator etc.
5	Force on a current carrying conductor in a magnetic field, Fleming's Left Hand rule.	<ul style="list-style-type: none"> ❖ Understanding the working of domestic electric circuits. ❖ Explains how the electric fuse and earthing protects the domestic electric circuit. ❖ Analyse the significance of neutral, earth and live wire, in order to understand formation of domestic electrical circuits. ❖ Draws the schematic diagram of common domestic circuit.
6	Domestic Electric Circuits.	

LESSON WISE PERIOD DIVISION





MIND MAP



PERIOD PLAN - 1

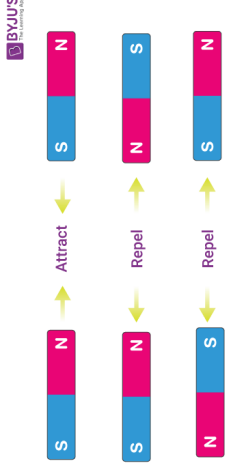

Class : X
 Chapter : MAGNETIC EFFECTS OF ELECTRIC CURRENT
 No. of Periods : 6
 Period No : 1
 Topic/Key Concepts : Activity 12.1 (Oersted Experiment), Magnetic field and field line - Activity 12.2

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT	MATERIALS REQUIRED
<p>Relates processes and phenomena with cause / effects such as deflection of compass needle due to magnetic effect of electric current.</p> <p>❖ Describes the contribution of Oersted in the field of electricity and magnetism</p>	<p>Teacher shows Bar Magnet, Compass, electric wire and asks to recognise .</p> <div style="text-align: center;">  </div> <p>✓ Can you guess this?</p> <div style="text-align: center;">  </div> <p>✓ Can you guess what is this ?</p>	<p>✓ Why compass needle always stay in North and South direction only?</p> <p>✓ Can we make a magnet with wire?</p>	<p>✓ Copper wire, 9V batteries, bar magnet, compass, nail, safety pins, paper clips.</p> <p>✓ Paper, iron fillings, bar magnets.</p>

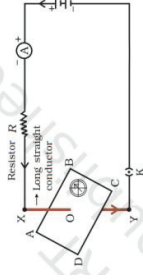


- ✓ Can you guess what is this ?
- ✓ If you bring a compass near to magnet what happens?
- ✓ What do you observe?
- ✓ If you bring the compass near to the copper wire what happens?
- ✓ Does the needle in the compass deflect now?
- ✓ Can you make a copper wire into a magnet so that the compass deflects?
- ✓ What happens when you pass current through this copper wire?
- ✓ Does copper wire act as a magnet when current is passed through it?
- * The electric current through the copper wire produces a magnetic effect. Thus we can say that electricity and magnetism are linked to each other.
- ✓ Is the reverse effect of this possible? (electric effect of moving magnets)
- ✓ We will study magnetic fields and such electromagnetic effects in this chapter. We shall also study about electromagnets which involve the magnetic effect of electric current.

<https://www.youtube.com/watch?v=oiA83WjIiKA>

	<p>(Teacher can discuss the life of scientist-OERSTED and his contribution)</p>  <p>ACTIVITY 12.1: Let's do this activity . (Teacher can watch this video to help children in performing the activity) https://www.youtube.com/watch?v=oiA83yylikA</p> <p>Teacher will set up the apparatus with help of copper wire, 9V battery. Teacher will wrap the nail with help of copper wire by multiple curls and then connect it's ends to the battery.</p> <ul style="list-style-type: none"> ✓ Why were iron objects attracting to the nail when current is allowed to pass through it? ✓ What do you think, if the magnet brings closure to the iron nail? ✓ What do you think if we remove the iron nail and keep only the copper wire? ✓ Will this wire (without iron nail) attract the iron objects? <p>Teacher can demonstrate the circuit of</p>	<ul style="list-style-type: none"> ✓ Which poles of magnet attract each other? ✓ Which poles of magnet repel each other? 	
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the performed activity 12.1. (Oersted experiment)



- ✓ Teacher will bring compass near to the wire.
- ✓ What do you observe?
- ✓ If current is allowed to pass through the circuit, do you observe any change in the position of the compass needle?
- ✓ Which is deflected in the compass?
- ✓ What is the reason for the deflection of needle in the compass?
- ✓ If we stop current through wire, will it act as a magnet?

ACTIVITY 12.2 :

(Teacher can take help of this video in helping the children.)

<https://www.youtube.com/shorts/KqnP9CnhX3E>

- ✓ Teacher will make group of 3 students in the classroom and let children do the activity.
- ✓ What do you observe any pattern in arranging themselves?
- ✓ Why do the iron filings arrange in such


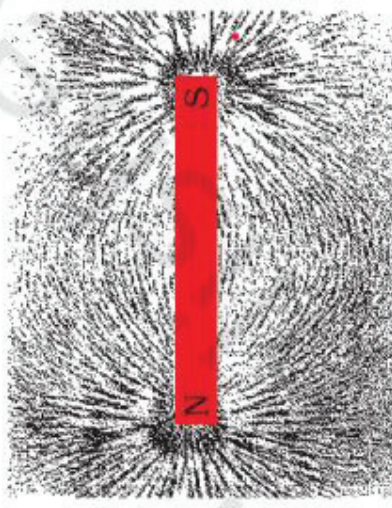
✓ Why the compass needle placed near to a current carrying wire deflects?

✓ Is there any relation between electricity and magnetic field?

✓ Why a current carrying wire attracts iron objects?

<https://www.youtube.com/shorts/KqnP9CnhX3E>



	<p>pattern?</p> <ul style="list-style-type: none"> ✓ What kind of force experience the iron filings? ✓ What do we call that region? ✓ What it represents the alignment of iron filings? ✓ Why such kind of pattern visible on the paper? ✓ Why the lines are denser at the pole of the magnet? 	<ul style="list-style-type: none"> ✓ What is the reason for arrangement of such pattern? ✓ What are magnetic field lines? ✓ What is magnetic field? ✓ A current carrying wire behave like a _____. 	<p>https://www.youtube.com/watch?v=e44-lbTo3C4</p> 
	 <p>Teacher can demonstrate this video to the children and will ask their observation.</p> <p>https://www.youtube.com/watch?v=e44-lbTo3C4</p>		
<p>Teacher Reflections & Experience :</p> <p>1. Did I clearly communicate the lesson objectives to the students?</p>			

2. How can I ensure that students understand the objectives and can demonstrate their knowledge or skills related to them?

3. Did I use effective instructional strategies to engage students in the lesson?


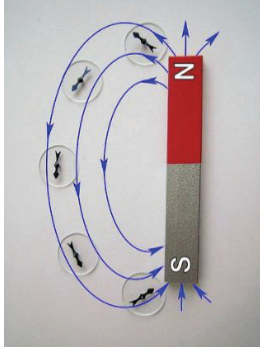
4. How can I improve the variety and effectiveness of my teaching methods to cater to different learning styles and needs?

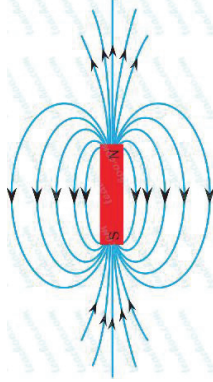
5. How well did I manage the classroom during the lesson?

These questions can serve as a **review** for teachers to reflect on their teaching practices and make informed decisions for future lessons.

PERIOD PLAN - 2

Class	: X		
Chapter	: MAGNETIC EFFECTS OF ELECTRIC CURRENT		
No.of Periods	: 6		
Period No	: 2		
Topic/Key Concepts	: Activity 12.3 (Drawing a magnetic field line with the help of a compass needle), Magnetic field due to a current carrying conductor.		

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT	MATERIALS REQUIRED
<p>Relates the processes and phenomena with cause/effects such as magnetic field due to a current carrying conductor.</p> <ul style="list-style-type: none"> ❖ Draws magnetic field lines around a bar magnet with the help of a compass needle. ❖ Describes magnetic field & field lines. 	<p>https://www.youtube.com/watch?v=mvpySuAY7pM Teacher will watch and setup the activity as mentioned in the video.</p> <p>Teacher will make group of students and they have to come near the setup and perform the activity.</p> <ul style="list-style-type: none"> ✓ Put the bar magnet on the paper. ✓ Where is North and South Pole of the magnet? ✓ Put the compass near to any pole of the magnet? ✓ Which pole of the needle points towards the north pole of the magnet? ✓ Which pole in the compass directed away from the north pole of the magnet? 		<p>Paper, magnetic compass, pencil.</p> <p>https://www.youtube.com/watch?v=mvpySuAY7pM</p> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div>

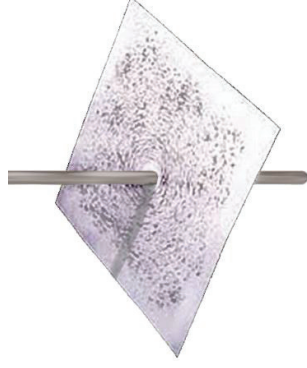
		<ul style="list-style-type: none"> ✓ If you mark the position of two ends of the needle after proceed in this way step by step, which pole do you reach? ✓ Which type of shape do you get after joining all these points? ✓ Can you tell about the pole of the bar magnet based on your observation on compass needle's deflection? ✓ Mark that place (fluctuated needle) with pencil. (Teacher will demonstrate one example of marking the compass needle) ✓ Place the compass little farther from the bar magnet. ✓ Again, notice the deflected compass needle and mark it on the paper. ✓ Keep moving the compass at various location of paper and mark it. ✓ Later, children will trace all marked points with the help of a pencil. ✓ Guess, which type of pattern do you get after drawing the lines? ✓ What will you call the curved line? ✓ Is the magnetic field has both direction and magnitude? ✓ Which is emerging point of field lines? ✓ Are the field lines closed? ✓ In which point do we find more lines? ✓ Is there any intersection of lines found at any point in the field? 	
	<ul style="list-style-type: none"> ✓ What is the direction of magnetic field? ✓ At which place the strength of magnetic field is more? ✓ Why field lines are dense at poles ? ✓ What happens if field lines are not dense? ✓ Why the magnetic lines of force do not intersect with each other? 		

ACTIVITY 12.4 :

Students understand the direction of the magnetic field

Teacher will watch the video and setup the activity as mentioned in the video. Teacher will setup the experiment and will demonstrate this to the children. Meanwhile he/she will ask relevant questions also.

<https://youtu.be/gpWYOEYK9ts?si=v8yYM9-0HwM23Bpl>



Case 1- Clock wise current direction through battery.

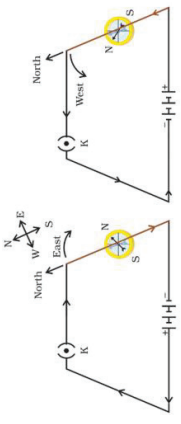
- ✓ If we put iron filings near the copper wire (which is not connected to battery), what do you observe?
- ✓ If we connect the wire with battery, what do you observe now ?
- ✓ Will there be magnetic field around the

Paper, iron filings, copper wire, battery.

- ✓ What do you observe when current is reversed in the circuit?

<https://youtu.be/gpWYOEYK9ts?si=v8yYM9-0HwM23Bpl>



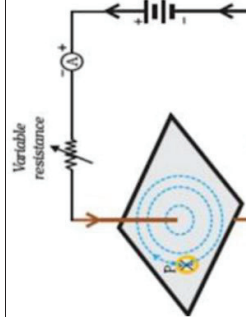
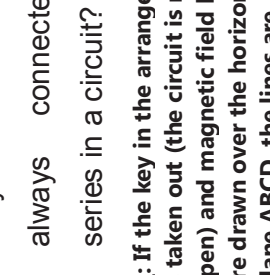
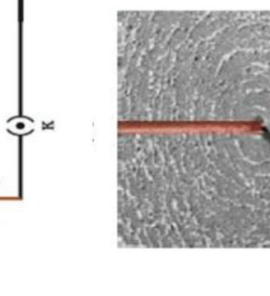
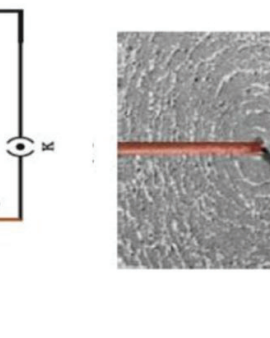
<p>copper wire?</p> <ul style="list-style-type: none"> ✓ If yes/no, why? ✓ Let's check it. ✓ Do you observe any change in the direction in the deflection of needle compare to the activity we did earlier? ✓ Why such kind of changes do appeared? 		<p>✓ What is the shape of magnetic lines around the copper wire? Is there any similarity of magnetic lines between this and previous activity? Summarise what you observed.</p>	
<p>Case 2- Anti-clock wise current direction through battery.</p> 		<ul style="list-style-type: none"> ✓ Is there any change in the direction of the needle of compass when the direction of the current is changed? ✓ What is the direction of the needle of compass placed in case 1? ✓ Is the direction of compass needle differ from the case 1? ✓ What determines the pattern of the magnetic field generated by a current 	

	<p>through a conductor?</p> <ul style="list-style-type: none"> ✓ Is the pattern of the magnetic field same for all current carrying conductors? ✓ Does the pattern depend on the shape of the conductor? ✓ We have to investigate whether the pattern of magnetic field due to a current carrying conductor depend on shape or not. ✓ Teacher will demonstrate magnetic field through various kinds of shape? ✓ What kinds of patterns do you observing in each shape? 	<ul style="list-style-type: none"> ✓ Does the magnetic field pattern depend on the shape of the conductor? Justify. 	
<p>Teacher Reflections & Experience :</p> <ol style="list-style-type: none"> 1. Were there any disruptions or behavioral issues that I need to address? 3. What strategies can I implement to improve classroom management? 8. Did the students actively participate and show interest in the lesson? 4. How can I increase student engagement and create a more interactive learning environment? 5. Did I assess student understanding effectively during the lesson? <p>These questions can serve as a review for teachers to reflect on their teaching practices and make informed decisions for future lessons.</p>			

PERIOD PLAN - 3

Class : X
 Chapter : MAGNETIC EFFECTS OF ELECTRIC CURRENT
 Total no.of periods : 6
 PERIOD NO : 3
 TOPIC/Key Concepts : Magnetic field due to a current through a straight conductor. Right - Hand Thumb Rule.

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT	MATERIALS REQUIRED
<ul style="list-style-type: none"> ❖ Represent magnetic field lines for a straight current carrying conductor, in order to identify the magnetic field strength at different points around it. ❖ Relates processes and phenomena with 	<ul style="list-style-type: none"> ✓ In this period we shall first observe the pattern of the magnetic field due to a current through a straight conductor. ✓ Activity 12.5 in the text book will be demonstrated by the teacher in the class room with care and precautions. Also play the video from the link provided for better understanding. ✓ When current is allowed to pass through the conductor by placing Key in the switch, what do you observe to the sprinkled iron filings on the card board around the conductor? 	<ul style="list-style-type: none"> ✓ What happens to the compass when placed near to the current carrying conductor? ✓ Is any magnetic field developed near a conductor when no current flowing through it? ✓ What is the difference between a Resistor and a Rheostat? ✓ What is the purpose of a Rheostat in the circuit? 	

<p>causes / effects, such as deflection of compass needle due to magnetic effect of electric current.</p>	<ul style="list-style-type: none"> ✓ What is the shape the iron filings align themselves when current flows through the conductor? ✓ What do these concentric circles represent? ✓ How can we find the direction of the magnetic field be found? 	<ul style="list-style-type: none"> ✓ What is the purpose of an Ammeter in the circuit? ✓ Why an ammeter is always connected in series in a circuit? 	
<p>❖ Takes initiative to know about scientific discoveries / inventions, such as Oersted discovery that electricity and magnetism are related.</p>	<ul style="list-style-type: none"> ✓ How can we change the direction of the current though the conductor?(Teacher may use commutator in place of key to change the direction of the current in the circuit) ✓ How can we increase the current in the circuit? ✓ What is the relation between strength of the magnetic field produced by a given conductor in the conductor and the distance from it? ✓ What is the reason for increase in the size of concentric circles as we move away from the conductor? 	<p>Q: If the key in the arrangement is taken out (the circuit is made open) and magnetic field lines are drawn over the horizontal plane ABCD, the lines are</p>  <p>a. Concentric circles b. Elliptical in shape c. Straight lines parallel to each other d. Concentric circles near point O but of elliptical shapes as we go away from it.</p>	 <p>https://www.youtube.com/watch?v=caHXwJbkbQU</p> 

✓ How can we know the direction of magnetic field produced by current carrying conductor?

✓ **RIGHT HAND THUMB RULE:**

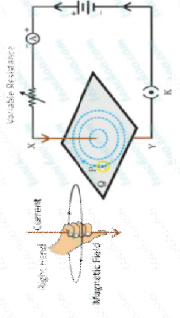
Statement:

The right hand thumb rule states that if we hold a straight current carrying conductor with our right hand such that the thumb points in the direction of the current, then the curled fingers indicate the direction of the magnetic field lines.

✓ If the current is flowing in the downward direction, then the direction of the curled fingers will be in a clockwise direction, and if the current is flowing in the upward direction, then the direction of the curled fingers will be in an anticlockwise direction.

✓ When we are drawing directions of magnetic fields and currents, we use the symbols \odot and \otimes The

Magnetic Field in a Straight Current Carrying Conductor



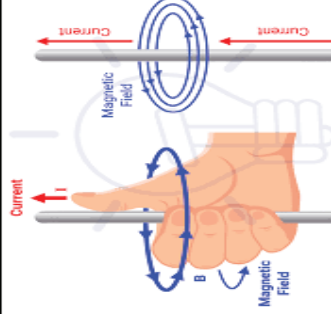
COMMUTATOR



symbol \odot represents an arrow that is coming out of the page and the symbol \otimes represents an arrow that is going into the page.

- ✓ Teacher will come back to the experiment of straight wire and will ask to the children that if the current is moving in this direction in the wire then what will be the direction of magnetic field (without using magnetic compass and iron filings)?

Right Hand Thumb/Grip Rule



- ✓ Is the direction of the compass is driven by the direction of electric field?

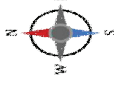
- ✓ How can be the direction of magnetic field be indicated?

- ✓ What will be the deflection of the compass needle at the same point on the card board if the direction of the current is reversed?

- ✓ If the current is increased in the conductor what happens to the deflection in the compass?

✓ What do you notice to the deflection of the needle if the compass is moved away to a point from the conductor without changing the amount of current in the conductor?

Q.Suhasdoing experiments with a straight wire in which a current flows toward east.

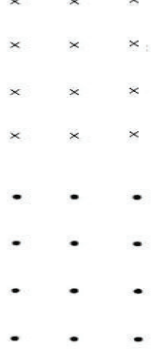
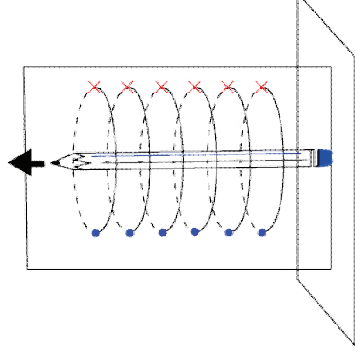


He then reverses the current so it flows toward west.



What happens to the magnetic field around the wire when the current direction is reversed

A. The magnetic field stays the same.

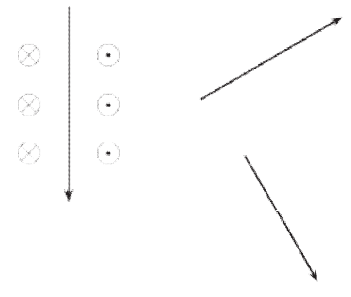


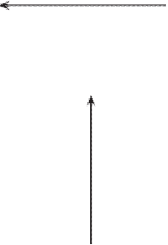
Outside the plane of paper

Inside the plane of paper

- B. Strength of the magnetic field increases.
- C. Direction of the magnetic field reverses
- D. Strength of the magnetic field decreases.

Q. Use the Right Hand Rule to draw in the directions of the magnetic fields for the following conductors with the currents flowing in the directions shown by the arrows. The first problem has been completed for you

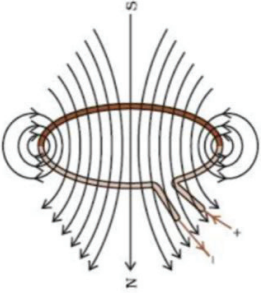
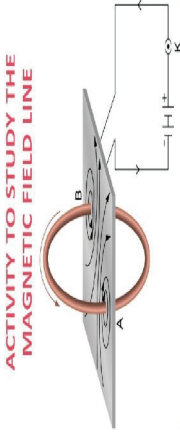
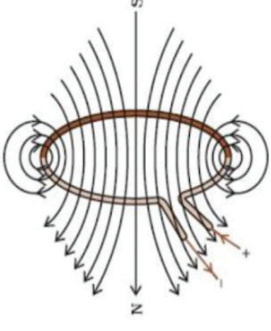


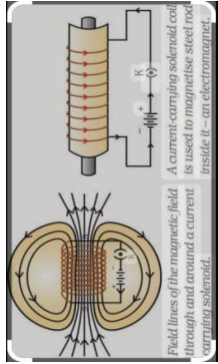

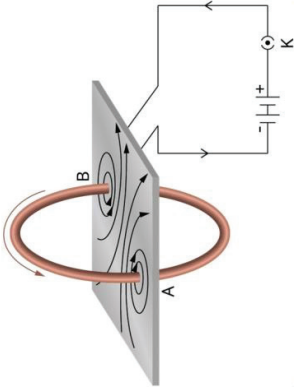
		 <p>Q. What are the uses of Right Hand Thumb Rule in electro-magnetism?</p>	
<p>Teacher Reflections & Experience : 1. Did I provide timely and constructive feedback to guide their learning?</p> <p>2. How can I improve my assessment and feedback practices?</p> <p>3. Was the pacing of the lesson appropriate?</p> <p>4. Did I cover all the planned content without rushing or leaving gaps?</p> <p>5. How can I better manage the time allocated for each activity?</p>			

PERIOD PLAN - 4

Class : X
 Chapter : MAGNETIC EFFECTS OF ELECTRIC CURRENT
 No. of Periods : 6
 Period No : 4
 Topic/Key Concepts : Magnetic field due to a current through a circular loop

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT.	MATERIALS REQUIRED
<p>Learning Outcomes-</p> <ul style="list-style-type: none"> ❖ Relates and draws magnetic field lines for current carrying circular loop in order to identify the magnetic field strength at different points around it as well as solenoid. ❖ Demonstrate magnetic field due to a current through a circular loop. ❖ Analyses the magnetic field pattern around a 	<p>Recall the previous knowledge</p> <ul style="list-style-type: none"> ✓ How is magnetic field formed through a straight conductor? ✓ What do you understand about Right hand thumb rule? ✓ Predict the direction of magnetic field using right hand thumb rule? <p>Content presentation: Teacher shows the video and asks the following questions:</p> <p>* We know the magnetic field lines produced around a current carrying wire. Suppose this straight wire is bent in the form of a circular loop and current is passed through it, how would the magnetic field lines look like?</p> <ul style="list-style-type: none"> ✓ On what factor the magnetic field produced by a current carrying straight wire depend on ? ✓ What does the magnetic field in a circular loop depend on? ✓ Why is magnetic field maximum at the poles? 	<ul style="list-style-type: none"> ● What is the magnetic 	


<p>solenoid carrying current.</p>	 <p> <ul style="list-style-type: none"> ✓ When does the magnetic field in a circular loop become zero? ✓ What happens to the magnetic field if the number of turns increases in loop of wire? </p> <p>Activity: 12.6 in text book: Teacher will demonstrate the activityduly involving the students. (Students can do this experiment under the guidance of teacher.)</p> <p> <ul style="list-style-type: none"> ✓ What do you observe in the pattern of iron fillings that emerges on the card board? </p>  <p>ACTIVITY TO STUDY THE MAGNETIC FIELD LINE</p> <p> <ul style="list-style-type: none"> ✓ What is the magnetic field pattern in circular coil? </p>	<p>field of a circular loop?</p> <ul style="list-style-type: none"> • What is the force on a current carrying circular loop in a magnetic field? • Does magnetic field intensity increases as number of turns increases? • What is the difference between loop and coil? • Draw the pattern of lines of force due to a magnetic field through a current carrying circular loop of wire? 	<p>Image shown on IFP</p>  <p>https://youtu.be/te8MO8jVh5k</p>
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	<p>✓ What happens to the magnetic field when field lines add up at the center of the coil?</p> <p>✓ How does the magnetic field changes if there are five loops?</p>  <p>Field lines of the magnetic field through and around a current carrying solenoid. A current carrying solenoid coil is used to magnetise steel rod inside it — an electromagnet.</p> <p>Teacher asks the following questions on the above concept.</p> <p>SOLENOID: A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder is called a solenoid.</p> <ul style="list-style-type: none"> * The pattern of the magnetic field lines around a current carrying solenoid is as shown in magnetic field is the figure. ✓ Is the pattern of magnetic field around a bar magnet and solenoid similar to each other? !* This indicates that solenoid behaves like a bar magnet with one end as north pole and other end is south pole. ✓ Do you observe the field line inside the solenoid? How they appear? * The field lines are parallel straight lines 	<ul style="list-style-type: none"> • What is the relation between magnetic field lines and number turns? • Which pole will appear on the face of the circular loop when current is passing in anti clock wise direction? • What is uniform magnetic field? • What is a solenoid? • How can we change the strength of the magnetic field of a solenoid? ✓ How do you identify the poles of a solenoid? <p>Q: For a current in a long straight solenoid N- and S-poles are created at the two ends. Among the following statements, the incorrect statement is:</p> <p>a. The field lines inside the</p>	 <p>ACTIVITY TO STUDY THE MAGNETIC FIELD LINE</p>  <p>Image shown on IFP</p>
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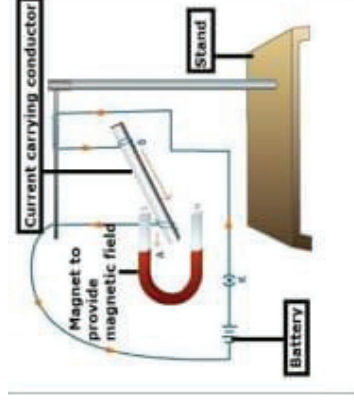
	<p>inside the solenoid.</p> <ul style="list-style-type: none"> ✓ How do you identify the poles of solenoid? ✓ Which pole does solenoid show when current is passing through clockwise direction? ✓ Which device is used to find out the polarity of solenoid? 	<p>solenoid are in the form of straight lines which indicates that the magnetic field is the same at all points inside the solenoid.</p> <p>b. The strong magnetic field produced inside the solenoid can be used to magnetize a piece of a magnetic material like soft iron when placed inside the coil.</p> <p>c. The pattern of the magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet.</p> <p>d. The N- and S-poles exchange position when the direction of current through the solenoid is reversed.</p>	
<p>Teacher Reflections & Experience : .</p> <ol style="list-style-type: none"> 1. What were my strengths during the lesson? 2. In what areas can I improve as a teacher? 3. How can I continue to develop my teaching skills and practices? 4. Did I encourage self-reflection and meta cognition among students? 5. How can I incorporate more opportunities for students to reflect on their learning and assess their own progress? <p>These questions can serve as a review for teachers to reflect on their teaching practices and make informed decisions for future lessons.</p>			

PERIOD PLAN - 5

Class : X
 Chapter : MAGNETIC EFFECTS OF ELECTRIC CURRENT
 No.of Periods : 6
 Period No : 5
 Key Concepts : Force on a current carrying conductor in a Magnetic field

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT.	MATERIALS REQUIRED
<ul style="list-style-type: none"> ❖ Explains Fleming's Left Hand Rule in order to understand the working of electric motor, generator, loud speaker etc. ❖ Analyses the factors that depends on the force acting current carrying conductor in a magnetic field. ❖ Exhibits creativity in designing and model using eco-friendly resources such as working model of electric motor & generator etc. 	<p>Recall the previous knowledge .</p> <ul style="list-style-type: none"> * What is solenoid ? * Where do you see a solenoid? * Where will we find more magnetic field strength in a solenoid ? <p>Activity 12.7 Teacher ask the the following questions by doing the activity.</p> <ul style="list-style-type: none"> • What materials used in this activity? • What is happening when the current is passing through a 		<p>https://youtu.be/hYKPDxdEct8</p> 

conductor?



- What happens when current carrying conductor is placed in magnetic field?
- Why does the rod gets displaced?
- Which force is acting on a current carrying conductor in a magnetic field points?
- What are the factors effecting the magnetic field of a current carrying conductor?
- What is the direction of force that is exerted on a current carrying conductor kept perpendicular to the

Q. What happens to the direction of force acting on a current carrying conductor when the direction of current is reversed?

Q. What is the Fleming's

	<p>external magnetic field?</p> <ul style="list-style-type: none"> • What causes the force acting on a current carrying conductor in a magnetic field? • Why does a current carrying conductor in magnetic field experience force? • On what factors does direction of this force depend? • State the rule used for determine the direction of the force on a current carrying conductor placed in a magnetic field? • Name one device whose working depends on the force exerted on a current carrying coil placed in magnetic field? • What is the condition for which the force on the current carrying conductor is zero? • On what factors does the force experience by a current carrying conductor placed in a uniform magnetic field depend? 	<p>left hand thumb rule?</p> <p>Q.Name three factors on which the magnitude of the force on current carrying conductor placed in magnetic field depend?</p> <p>Q.Name some devices which use magnetic field and current carrying conductors?</p> <p>Q.How do you increase the force on current carrying conductor in magnetic field?</p> <p>Q.How does Fleming's left hand rule help us to find the direction of the force acting on a current carrying conductor?</p>	
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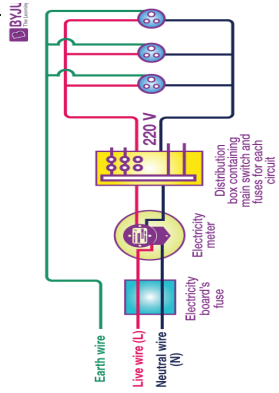
Teacher Reflections & Experience : .

1. Did I critically examine student work to gain insights into their understanding and identify areas for improvement?
2. How can I use student work as a valuable source of information for my teaching?
3. Did I effectively utilize formative assessments to monitor student progress and adjust instruction accordingly?
4. How can I further integrate assessment for learning strategies into my teaching practice?

These questions can serve as a **review** for teachers to reflect on their teaching practices and make informed decisions for future lessons.

PERIOD PLAN - 6

Class : X
 Chapter : MAGNETIC EFFECTS OF ELECTRIC CURRENT
 No. of Periods : 6
 Period No : 6
 Key Concepts: Domestic electric Circuits

LEARNING OUTCOMES	TEACHING LEARNING PROCESS	POINTERS FOR ASSESSMENT	MATERIAL REQUIRED
<ul style="list-style-type: none"> ❖ Understanding the working of domestic electric circuits. ❖ Explains how the electric fuse and earthing protects the domestic electric circuit. ❖ Analyze the significance of neutral, earth and live wire, in order to understand formation of domestic electrical 	<p>Teacher can go through this video to understand the house electric circuit and guide teachers also.</p> <p>https://www.youtube.com/watch?v=U9ZSfhknkbTQ&pp=ygUtYnlqdXMgZG9tZXN0aWMgZWx1Y3RyaWMgY2lyY3VpdCAGc2hvcnQgdmlkZW8g</p> <p>Teacher can refer this video also- https://youtu.be/fkYeC39xcyw?si=IFrshtDdfealaMGz</p> <ul style="list-style-type: none"> ✓ How electricity being supplied to your house? ✓ Have you seen electric power stations in your village/towns which supply power to homes? ✓ How electricity reach to various home 		<div style="text-align: center;">  <p>Image on IFP</p> </div> <div style="text-align: center;">  <p style="text-align: center;">Domestic Electric Circuit</p> </div>

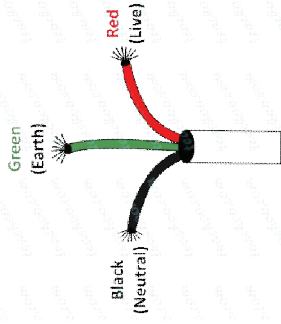
circuits.

- ❖ Draws the schematic diagram of common domestic circuit.

appliances in your home?

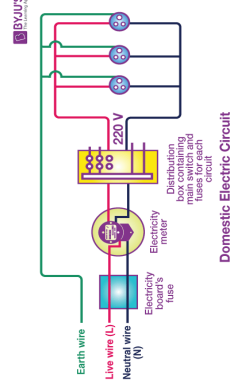
- ✓ Do you how many colour wires generally use in the house wiring?
- ✓ Which colour is used for positive terminal and which colour is used for negative terminal?
- ✓ What is the other colour wire found in wiring along with these two colours?

Different types of Wire in Electric Circuit



*At present some times BLUE colour is also used as NEGATIVE(Neutral) wire

- ✓ DO you know the potential difference between the two wires(positive and negative) in our country?
- ✓ Is there any variation in potential difference between positive and negative wires from country to country?
- ✓ Have you ever felt shock by electricity or electrical appliances any time in your house?
- ✓ Have you ever heard about short circuiting? If yes, what is it?



✓ In the above diagram identify the live wire, neutral wire and earth wire?

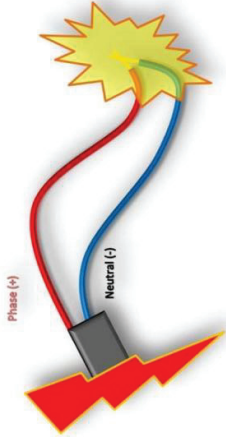
✓ What is the potential difference between live and neutral?

Q: The frequency of AC in some countries is 60 Hz. What does this mean?

- a. The current changes direction 60 times in a second
- b. The current changes direction 120 times in a second
- c. The current changes direction after every 60 seconds
- d. The current changes direction after every 120 seconds



SHORT CIRCUIT



- ✓ How can you prevent short circuit?
- ✓ Do all home appliances operates at same power?
- ✓ How many types of electric circuits will be found in houses? (* 15A and 5A circuits)
- ✓ Whichhome appliances are generally connected to 15 amperes current rating circuit?
- ✓ Whichhome appliances are generally connected to 5 amperes current rating circuit?
- ✓ How many ways of connections we have in electrical wiring?
- ✓ Which type of connection we generally use in house wiring?
- ✓ What is a short circuit?

Question

- (a) What is meant by short-circuiting in electric supply?
- (b) What is the function of earth wire in electrical instruments?
- (c) What is the usual current rating of the fuse wire in the power supply line which runs (i) lights and fans, and (ii) appliances of 2 kW power?

**** In a circuit if the insulation of wires is damaged then live wire and neutral wire come into direct contact due to which the current in the circuit increases abruptly. This is called short-circuiting.**

- ✓ What should we do to avoid short circuiting?
- ✓ Is short circuiting lead to any consequence in electric flow?
- ✓ If huge amount of current is supplying in the circuit then what will happen?
- ✓ What is overloading?

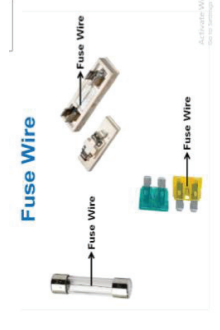


● Overloading is some times caused by connecting too many appliances to a single socket.

- ✓ What is the purpose of using a fuse in a circuit?

Answer the following:

- Why don't we connect series circuit in our house?
- What happens when we connect the circuit in series?
- How a domestic electric circuit is different from other circuits?
- What is the difference between fuse and MCB?
- What are the use of MCB? And how it is a better alternative to fuse?



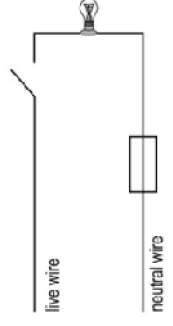
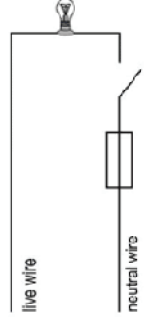
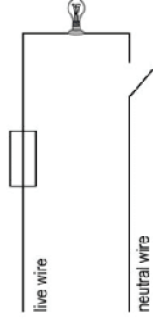
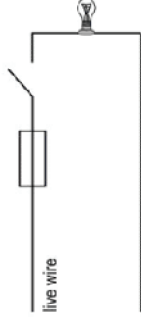
✓ What is the alternative component we are using in place of FUSE now a days?

✓ Is MCB reusable?

✓ On which principle the fuse work?

✓ On which principle MCB works?

Q: Which circuit shows the correct and safe positions for the fuse and the switch?



Teacher Reflections & Experience :.

1. Did I clearly communicate the lesson objectives to the students?
2. How can I ensure that students understand the objectives and can demonstrate their knowledge or skills related to them?
3. Did I use effective instructional strategies to engage students in the lesson?
4. How can I improve the variety and effectiveness of my teaching methods to cater to different learning styles and needs?
5. How well did I manage the classroom during the lesson?

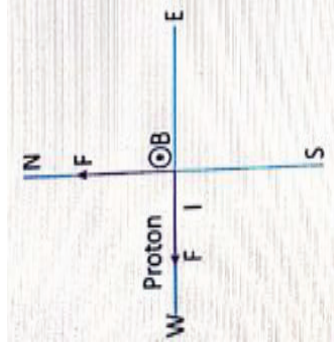
These questions can serve as a **review** for teachers to reflect on their teaching practices and make informed decisions for future lessons.

E-content References:

PERIOD NO.	TOPIC	E CONTENT REFERENCES
1	<p>Activity (12.1) (Oersted experiment) Magnetic Field & Field lines. (12.2 Activity)</p>	<ul style="list-style-type: none"> • https://www.youtube.com/watch?v=oiA83yyIikA • https://www.youtube.com/shorts/KgnP9CnhX3E • https://www.youtube.com/watch?v=e44-lbTo3C4
2	<p>Activity (12.3) (Field lines around a bar magnet) , 12.2 Magnetic Field due to a current carrying conductor.</p>	<ul style="list-style-type: none"> • https://www.youtube.com/watch?v=mvpySuAY7pM • https://youtu.be/gpWYOEYK9ts?si=v8YYM9-0HwM23Bpl
3	<p>Magnetic field due to a current through a straight conductor, Right-Hand thumb Rule.</p>	<ul style="list-style-type: none"> • https://www.youtube.com/watch?v=caHXwJbkbQU
4	<p>Magnetic field due to a current through a circular loop, magnetic field due to a current in a solenoid.</p>	<ul style="list-style-type: none"> • https://youtu.be/te8MO8jVh5k
5	<p>Force on a current carrying conductor in a magnetic field, Fleming's Left Hand rule.</p>	<ul style="list-style-type: none"> • https://youtu.be/hYKPDxdEcT8
6	<p>Domestic Electric Circuits.</p>	<ul style="list-style-type: none"> • https://www.youtube.com/watch?v=U9ZSfhkbtQ&pp=ygUfYnlqdXMgZG9tZXN0aWMgZWxY3RyaWMgY2lyY3VpdCAgc2hvcnQgdmlkZW8g • https://youtu.be/tkYeC39xcyw?si=IFrshtDdfealaMGz

WORK SHEET-1

- 1 Which of the following correctly describes a magnetic field near a straight current carrying conductor
 - A. The field consists of straight lines perpendicular to the wire
 - B. The field consists of straight lines parallel to the wire
 - C. The field consists of radial lines originating from the wire.
 - D. The field consists of concentric circles centered on the wire.
- 2 The magnetic field intensity produced due to a current carrying coil is maximum at:
 - A. Any point
 - B. Centre of the coil
 - C. Any point lying on the axis of the coil
- 3 A positively charged particle (alpha particle) projected towards west is deflected towards north by a magnetic field. The direction of magnetic field is:



- A. Towards South
 - B. Towards East
 - C. Downward
 - D. Upward
- 4 Choose the correct option.
- The magnetic field inside a long straight solenoid-carrying current
- (a) is zero
 - (b) decreases as we move towards its end
 - (c) increases as we move towards its end
 - (d) is the same at all points

- 5 Consider a circular loop of wire lying in the plane of the table. Let the current pass through the loop clockwise. Apply the right-hand rule to find out the direction of the magnetic field inside and outside the loop.
- 6 A student performs an experiment to study the magnetic effect of current around a current carrying straight conductor. He reports that
1. The direction of deflection of the north pole of a compass needle kept at a given point near the conductor remains unaffected even when the terminals of the battery sending current in the wire are interchanged.
 2. For a given battery, the degree of deflection of a N-pole decreases when the compass is kept at a point farther away from the conductor.
- Which of the above observations of the student is incorrect and why?
- 7 An electric oven of 2 kW is operated in a domestic electric circuit (220 V) that has a current rating of 5 A. What result do you expect? Explain.
- 8 When is the force experienced by a current-carrying conductor placed in a magnetic field largest?
- 9 The magnetic field in a given region is uniform. Draw a diagram to represent it.
- 10 State Fleming's left-hand rule.

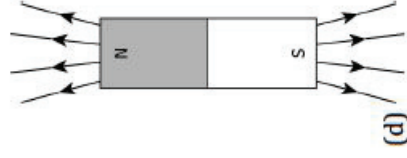
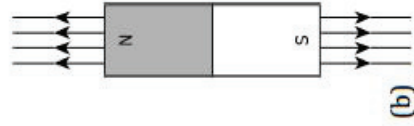
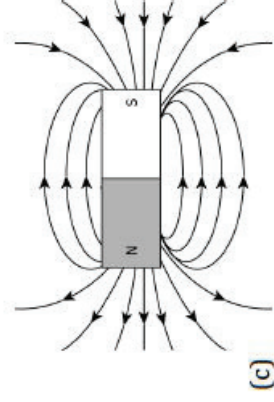
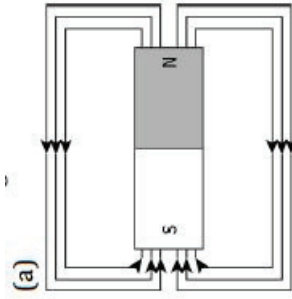
WORK SHEET-2

1. To avoid the risk of electric shock, which phenomenon is used?
2. A soft iron bar is introduced inside a current-carrying solenoid. The magnetic field inside a solenoid:
 - a) Decrease
 - b) Will increase
 - c) Will become zero
 - d) Will remain unaffected
3. The magnetic field inside a long straight solenoid carrying current:
 - a) Is zero
 - b) Decrease as we move towards its end
 - c) Is the same at all points
 - d) Increase as we move towards its end
4. The front face of a circular loop of a wire is the North Pole, the direction of current in this face of the loop will be:
 - a) Clockwise
 - b) Anti clock wise

c) Towards North

d) Towards South

5. A student learns that magnetic field strength around a bar magnet is different at every point. Which diagram shows the correct magnetic field lines around a bar magnet?



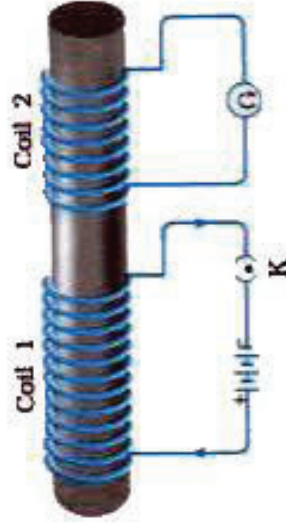
6. The magnetic field inside a long straight current carrying conductor is?

- a) is zero
- b) decreases as we move towards its end
- c) increases as we move towards its end
- d) is same at all points

7. Fleming's left hand rule gives?

- a) Magnitude of the induced current
- b) Magnitude of the Magnetic field
- c) Direction of the induced current
- d) Both, direction and magnitude of the induced current

8. Two coils of insulated copper wire are wound over a non-conducting cylinder as shown. Coil-1 has a large number of turns



9. State your observations when
- (i) Key K is closed
 - (ii) when Key K is opened
- Give reason for each of your observation.
10. A coil of insulated wire is connected to a galvanometer. What would be observed if a strong bar magnet with its south pole towards one face of the coil is
- (i) moved quickly towards it?
 - (ii) moved quickly away from it ?
 - (iii) Held stationary near it?
- (b) Name the phenomenon involved?

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