GRADE 8

TEACHERS' GUIDE

LESSON PLANS SCIENCE

(JANUARY-2025)

TACTILE LEARNING STRATEGIES

TACTILE LEARNING STRATEGIES FOR SCIENCE-EDUCATION, KPK

GRADE 8

TEACHERS' GUIDE

LESSON PLANS

SCIENCE

(JANUARY-2025)

KPK CURRICULUM AND TEXTBOOK BOARD,
KHYBERPAKHTUNKHWA

Rationale for the Teacher Guide**':**

The repercussions of this event based on how students got responsibilities in learning general science at various topics and the role of parents and teachers will be important. Because teachers and parents convince them to share their ideas and their dropout rate will becomes less, have been felt in all disciplines of life including economy, education, habits, cultural norms, health care services, etc. so severely that the world finds itself helpless. Institutes imparting education had to modify and adapt their educational services strategies to cope with the new challenges after the opening of these institutes for about whole year in Pakistan

Tactile Learning Strategies for grades 1 to 8. It was deemed important to select three major subjects of study *vis a vis* English, physics and Science and address all major and important skills and concepts within these areas of study in the most effective manner. Subsequently, it was the Herculean task to squeeze a nine-month syllabus of study into a five-month period, keeping in view skills development, conceptual understanding, horizontal and vertical alignment of the Student Learning Outcomes and a gradual but logical progression of concepts for all grade levels.

Lesson Plans as a manifestation based on tactile learning strategies:

In the next step, SLOs were aligned with the material and exercises of the textbooks which ultimately culminated into the development of Lesson Plans. These lesson plans will be shared with you on a rolling basis. It is expected that these plans will act as a ready resource for teachers to achieve learning outcomes in an efficient and effective way. Along with the Lesson Plans, it was decided to develop age-appropriate and engaging worksheets that would benefit students and act as a reservoir for reinforcement of skills and concepts taught in class. Therefore, subject experts were engaged to undertake the daunting task of reshaping and reconfiguring the syllabuses for Mathematics, Science and English.

It has been ensured that the lesson plans are aligned with the level of students and the demand of the Student Learning Outcome. The focus, during this entire exercise, has also been to oversee that classroom instruction is aligned with the goals and objectives of curriculum. Every effort has been made to help foster positive attitudes among students towards learning. Yet another purpose of this exercise is to help teachers create a healthy learning environment in classrooms.

It is a known fact that proper and well thought out lesson planning serves as a checklist that guides teachers to be systematic in the effective delivery of their lessons. Equipping teachers with a systematic, cohesive and an organized breakdown of the syllabus and providing them with well-planned lessons is in a bid to help them be prepared to take on any unforeseen challenges during the process of teaching and learning. Notwithstanding, lesson plans serve as historical documents of teaching practices whereby teachers have a point of reference to look back, reorganize and update their lesson for future usage.

Moreover, well thought out lesson plans help teachers to address challenges during lessons and employ pedagogies that enhance and consolidate learning. Not only this, but a good lesson plan minimizes the negative effects of learning on students, in case of teacher PRESENCE, as a cover teacher can deliver the lesson using the guidelines elaborated upon in the plan. Just like every good game needs a plan to win, similarly, every teacher needs a good plan to achieve lesson objectives. Last but not the least lesson planning prevents the over-reliance on textbooks, as direct and the only material for teaching.

The recently created lesson plans are a very useful, contextualized, and user-friendly resource that will be useful to teachers in the public sector. It is hoped that teachers will find the lesson plans to be very beneficial and effective, and that they will be able to observe tangible, long-lasting, outcome-oriented learning. Additionally, these strategies are founded on inquiry-based, collaborative, and interactive methodologies and approaches to improve the effectiveness, vibrancy, and engagement of classroom learning. These lesson ideas, which are based on free or inexpensive materials, can be implemented with little work and provide significant learning and conceptual comprehension benefits for both teachers and students.

- The book's main emphasis was on the benefits of tactile learning techniques for kids. Has focused not only on creating lesson plans that meet student learning objectives and enable educators to guide students in understanding topics, but also on making sure that plans are logically broken down into three primary areas:
- Instruction
- Assessment
- Strengthening
- To is recommended that time be allotted to each domain in the following percentage while presenting the plans in order to guarantee optimal execution and maximize the benefits for both teachers and students:
- Teaching 75%
- Assessment 15%
- Reinforcement 10%
- **A focus on using worksheets to reinforce concepts and abilities:**
  In addition to the aforementioned, worksheets have been created to support and enhance each of the SLOs listed in the textbook. You will receive the worksheets on a rolling basis, just like the lesson plans. Every worksheet improves conceptual clarity and offers practice. Additionally, the purpose of these worksheets is to keep the pupils busy at home with constructive and constructive tasks.
  Making the most of the exercises:

In addition to their primary function of consolidating and clarifying topics, the worksheets can also be utilized as

- How Tactile Learning Strategies are effective for learning
- Assessment for learning
- Additional resource to be used in class
- Sample activities for teachers to replicate and devise their own worksheets on similar line.

Tips for Teachers:

To optimize these developed lesson plans, it is advisable for teachers to:

- Examine and fully grasp the pertinent lesson plan (read and comprehend the text at least twice); consult the appropriate textbook while reviewing the plan; read and understand the pertinent chapter; take notes as needed; and confirm that the materials listed are available. SLOs, activity progression, phases, transitions, and important points should be highlighted. We should also picture your actual classroom, space, seating arrangement, and problems. We should also anticipate how group, pair, and individual work will be organized.
- Play the role of facilitator, leader and manager.
- Try your best to execute the lesson plan in its true spirit.
- Ensure proper time management.
- Adapt activity, if it is unavoidable.

- use the teacher's judgement when implementing the lesson; for instance, if we think a concept requires more time, we might move the lesson to the following period.
- Conclude the lesson with a positive message and a positive attitude.

Components of Lesson Plans:

A title, topic, or problem, the determination of Student Learning Outcomes (SLOs), a series of learning activities that include introductory, developing, and ending activities, a list of resources to be used, and evaluation techniques are all common components of lesson plans or units of study.

Choosing the Topic: we can select a topic from the textbook, a skill like acquiring knowledge, a value like peace, a topic related to current events, or a topic of particular concern like the environment.

Identifying Student learning Outcomes (SLOs) from the Curriculum. The Student Learning Outcomes for each topic have been determined by the national curriculum; if we do not have access to the National Curriculum document for the subject, we are teaching, we can create your own SLOs. Clarifying the knowledge, abilities, and attitudes/values that need to be developed is made easier by identifying the student learning outcomes. To create our lesson, pick just one to three SLOs (many more for a unit plan).

Development: Learning Activities:

Introductory Activities:

The purpose of introductory exercises is to present the subject, a subtopic, or to make a link with the lesson that came before it. They are intended to increase preparedness, spark curiosity, examine what kids already know about the subject, elicit pertinent information, inspire pupils, and direct their emphasis on the subject, theme, or issue under study. Picture arrangements and other activities that pique curiosity and prompt enquiries are examples of introductory activities. It could be centered on the instructor reciting a poetry or narrative, asking questions, outlining an issue or conundrum, or inviting a guest speaker.

Developmental Activities:

The beginning activities ought to give rise to developmental ones. To create a seamless learning sequence, there should be seamless transitions between the activities. The purpose of these exercises is to achieve the learning objectives for the students. They should be connected to one another and either build on prior

knowledge or offer new ideas, abilities, and values. Activities for data collection or intake should be followed by data organization, demonstration or application, and finally, creative and expressive activities. The input required to address questions and hypotheses is provided by data collection or intake operations. Information can be summarized and structured with the use of activity organization. Activities that are demonstrative or applicable broaden learning and improve the application of ideas and abilities. Activities that are expressive and creative enhance education and foster the development of STUDENTS.

Concluding Activities:

Science exercises aimed at consolidating, summarizing, or assisting students in applying their knowledge and abilities to a novel situation are known as concluding exercises based on tactile learning strategies. In general, they have something to do with the lesson's central concept

Material materials:

Ensuring the materials needed to deliver the lesson successfully is a crucial aspect of planning.
Resources for instructors and students are planned, found, created, or modified.

Evaluation of Learning:

We can determine the degree to which student learning objectives have been met by using assessment techniques that are relevant to tactile learning styles. From the beginning until the end of the session or unit, assessment of learning is crucial. The achievement of the selected Learning Outcomes can be evaluated using a range of instruments. Some of these will be prepared as part of the learning activities, such as the final written report, the checklist for assessing a conversation, and the map that has been drawn and labelled. Tests and other

Assessment/Evaluation:

Making sure your students have reached their objective is the main goal of this segment. Instructors must collect proof that they did.

A teacher, at this stage, should ask herself/himself:

"How will I assess the identified student learning outcomes?"

Which kind of evaluation will provide me with the most precise and transparent image of my pupils' development?

"What learning gaps have I found that require reconsideration and reevaluation?"

"How can I ensure the validity and reliability of my student assessments?"

Table of Contents

Grade 8

Lesson 1

LENSES
LENS AND TYPES OF LENSES

Student Learning Outcomes

- Define lens.

Duration/Number of Period/s

40 minutes /1 period

Period 1: 40 minutes

Information for Teachers

Lenses

- Lenses are widely used in our life. Many eyesight defects are corrected using lenses. Lenses are commonly used in spectacles, cameras, microscopes, telescopes, binoculars, projectors and many other instruments for different purposes.
- Contact lenses are also becoming very popular these days. These can be placed in eyes and removed easily when needed.
- A lens is a piece of any transparent material (like glass) with two faces, of which at least one is curved. Each surface of a lens is a part of a sphere.
- The centre of such a sphere is called centre of curvature (C). The centre of the lens is called optical centre (O). The line passing through the optical centre and centre of curvature of the faces of the lens is called principal axis or optical axis as shown in figure 10.1 at page# 138 of the textbook.

Types of Lenses

- There are two types of lenses; convex lens or converging lens and concave lens or diverging lens as shown in figure 10.2 at page# of the textbook.
- A convex lens is thicker in the middle and thinner at the edges. A concave lens is thinner in the middle and thicker at the edges.

Material/Resources Required

Grade 8

Lesson 1

Writing board, board markers, textbook, concave lens, convex lens, activity sheet, scale.

Introduction — 5 minutes

The teacher will:

- ask the students, what is light?
  Expected response: light is a type of energy which produces sensation of vision in eyes.
- ask the students what is refraction of light? **Expected response:** when light enters from one transparent medium to another, it changes its path; this process is called refraction of light.
- ask the students, describe two types of refraction of light.
  Expected response: when light enters from rare medium to denser medium, it bends towards the normal and when light enters from denser medium to rare medium, it bends away from the normal.
- ask them, what are denser and rare medium?
  Expected response: a medium of higher density is called denser medium and a medium of lower density is called rare medium.
- now ask the students, do you know that refraction of light is used in our daily life?
  Expected response: yes/no
- then introduce "lenses and its types".

Development — 20 minutes

Activity — 20 minutes

The teacher will:

- divide the students into six groups.
- distribute the following activity sheets. (one per group).
- ask the students to complete the sheet (students may take help from textbook).

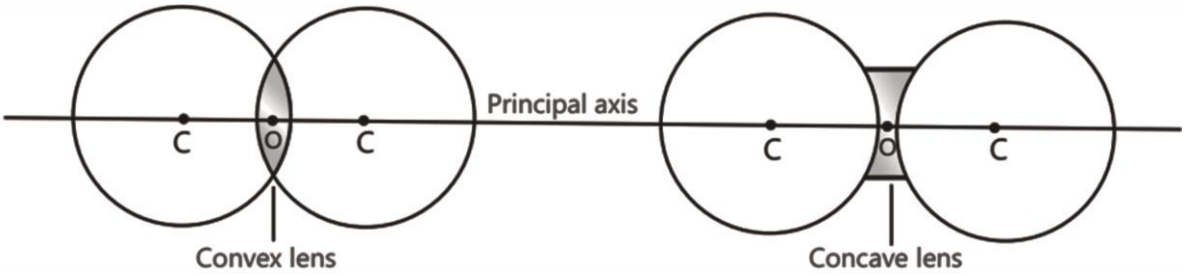
Grade 8

Lesson 1

Activity Sheet

Fill in blanks with a suitable word.

1. Every lens is a piece of any _____material (like glass) with two faces, of which at least one is curved.
2. Each surface of a lens is a part of a _____.
3. The centre of a sphere "C" is called centre of _____.
4. The centre of the lens "O" is called _____.



5. A _____lens is thicker in the middle and thinner at the edges.
6. A _____lens is thinner in the middle and thicker at the edges.

Answer the following questions:

1. Where do we use lenses?

_____

_____

2. Where do we use contact lenses?

_____

_____

- call students randomly from each group to present their work.
- reinforce the concept as, lens is a piece of any transparent material (like glass) with two faces, of which at least one is curved. Each surface of a lens is a part of a sphere.
- The centre of such a sphere is called centre of curvature (C). The centre of the lens is called optical centre (O).
- The line passing through the optical centre and centre of curvature is called principal axis or optical axis.
- provide feedback to students where required.

Grade 8

Lesson 1

Conclusion/Sum up — 5 minutes

At the end of lesson, the teacher will summarize the topic as:

- Lenses refract light.
- Lenses do not reflect light.
- Convex lens is converging lens while concave lens is diverging lens.
- A convex lens is thicker in the middle and thinner at the edges.
- A concave lens is thinner in the middle and thicker at the edges.

Assessment — 5 minutes

For assessment purpose, the teacher will ask the following questions:

- Define lens.
- Define convex lens.

Homework — 5 minutes

Ask students to write answers of the following questions on their notebooks.

Q.1. Differentiate between refraction and reflection of light.

Q.2. Define centre of curvature.

Q.3. Define diverging lens.

Worksheet

This lesson plan contains a work sheet (GRADE 8, G. Science, WORKSHEET # 1, Lesson 1). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish lecture. Please also make sure that explain the instructions of attempting the worksheet to the student.

Grade 8

Lesson 2

PRINCIPAL FOCUS AND FOCAL LENGTH OF THE LENSES. HOW TO FIND FOCAL LENGTH OF A LENS?

Student Learning Outcomes

- Differentiate between the different types of lenses.

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

Principal Focus (F) and Focal Length (f) of the Lenses

- In case of convex lens, the light rays parallel to the principal axis after refraction through the lens meet at a point.
- This point is called principal focus (F) or focus point of convex lens as shown in figure 10.3 at page# 138 of the textbook.
- As the light rays actually meet at the focus point after refraction through the convex lens, so the focus point is 'real'.
- The distance between the optical centre (O) and focus point (F) of the lens is called focal length (f).
- Focal length of a convex lens is taken as positive.
- Since a convex lens actually converges light at principal focus (F), that is why, it is also known as converging lens.
- Because of this property, convex lens makes real image on the screen placed on the other side of the lens.
- In case of concave lens, light rays parallel to the principal axis after passing through the lens bend in such a way that they do not meet at one point.
- They diverge out and appear to be coming from one point which is called principal focus.
- The principal focus of a concave lens is 'virtual'.
- The focal length of a concave lens is taken as negative.
- The image is not formed on the screen by a concave lens as shown in figure 10.4 at page# 139 of the textbook.

Grade 8

Lesson 2

How to Find Out Focal Length (f) of a Lens?

- We use lenses of different focal lengths for different purposes.
- For the correct use of a lens, its focal length must be known.

Material/Resources Required

Writing board, board markers, charts, convex lens, concave lens, ball point, lead pencil, scale etc.

Introduction — 5 minutes

The teacher will:

- ask the students, what is lens?

  Expected response: a piece of any transparent material (like glass) with two faces, of which at least one is curved is called lens.
- ask the students, what is optical centre?

  Expected response: centre of lens is called optical centre.
- ask them, define principal axis.

  Expected response: the line passing through the optical centre and centre of curvature is called principal axis.
- now ask them, what is convex lens?

  Expected response: such lens which converges light is called convex lens or converging lens.
- ask the students, what is concave lens?

  Expected response: such lens which diverges light is called concave lens or diverging lens.
- ask the students, do you know about the point at which convex lens converges light?

  Expected response: No.
- tell that today we will learn about "principal focus and focal length of the lenses".

Grade 8

Lesson 2

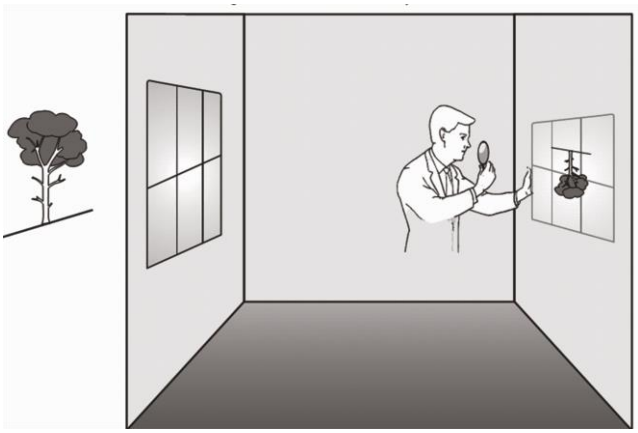
Development **20 minutes**

Activity **20 minutes**

Instructions:

The teacher will:

- take a convex lens and position yourself near the wall opposite to the window.
- direct the lens towards the window in such a way that an image of a distant object such as a tree is formed on the wall.
- move the lens slowly towards or away from the wall so that the image on the wall becomes sharp.
- note the distance between the lens and the wall at this position. This distance is called focal length of lens.
- measure this length and note it.
- now take a concave lens and try to obtain the image of the same object on the wall.
- tell the students that no image is formed on the wall by the concave lens.



- reinforce the concept and explain that:

Grade 8

Lesson 2

- reinforce the concept and explain that:
  - ❍ in case of convex lens, the light rays parallel to the principal axis after refraction through the lens meet at a point as shown in figure# A.
  - ❍ This point is called principal focus (F).

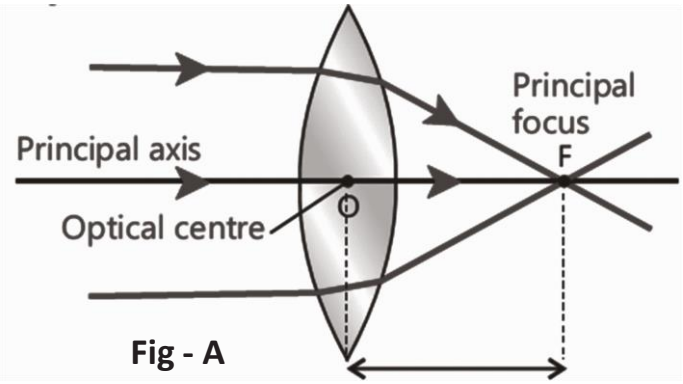


Fig - A

  - ❍ in case of concave lens, light rays parallel to the principal axis after passing through the lens bend in such a way that they do not meet at one point.
  - ❍ They diverge out and appear to be coming from one point which is called principal focus as shown in figure# B.
  - ❍ The principal focus of a concave lens is 'virtual'.

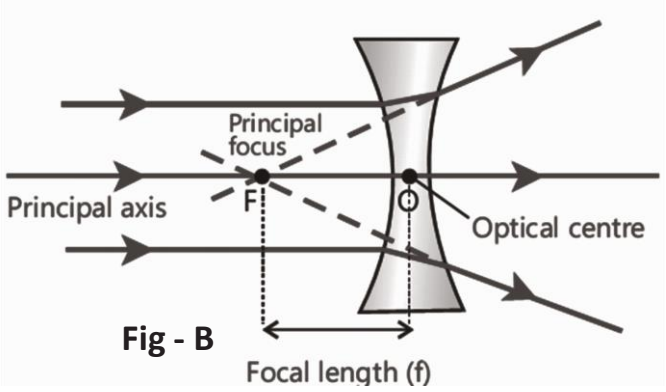


Fig - B

Activity Sheet

Choose the correct word from the list given below and write it in the blanks provided.

List: diverging, real, negative, virtual, positive.

I. Focal length of convex lens is _____.

II. Focal length of concave lens is _____.

III. Image formed by the convex lens is _____.

IV. Image formed by the concave lens is _____.

V. Concave lens is also called _____lens.

Grade 8

Lesson 2

Conclusion/Sum up — 5 minutes

- Principal focus of convex lens is real.
- Focal length of convex lens is positive.
- Principal focus of concave lens is virtual.
- Focal length of concave lens is negative.

Assessment — 5 minutes

For assessment purpose, the teacher will ask the following questions:

- Define principal focus.
- Define focal length.

Homework — 5 minutes

Ask students to write answers of the following questions on their notebooks.

1. Make a comparison between focal length of convex lens and focal length of concave lens.
2. Explain that focal length of all convex lenses is same or different?
3. Define diverging lens.

Worksheet

This lesson plan contains a work sheet (GRADE 8, G. Science, WORKSHEET # 2, Lesson 2). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish lecture. Please also make sure to explain the instructions of attempting the worksheet to the student.

Grade 8

Lesson 3

IMAGE FORMATION USING A LENS BY RAY DIAGRAM

Student Learning Outcomes

- Describe the image formation using a lens by ray diagram.

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

Image Formation Using a Lens by Ray Diagram

- To find the position and nature of the image of an object by ray diagram method, following are the steps:
- Draw the positions of the object, lens and focal points on the principal axis.
- Draw any two rays from top of the object.
- In case of a convex lens, the point at which these rays cross each other after refraction is the top of the image.
- Let us draw the ray diagrams to locate the image of an object placed at different positions in front of the convex lens as shown in fig.10.8 at page# 142 of the textbook.

Case-1: When the object is placed beyond 2F, the image is formed on the other side of the lens between F and 2F.

- ❍ The image is real, inverted and smaller in size than the object.

Case-2: When the object is at 2F, the image is also formed at 2F on the other side of the lens.

- ❍ The image is real, inverted and equal in size to the object.

Case-3: When the object is between F and 2F, the image of the object is formed beyond 2F on the other side of the lens.

- The image is real, inverted and larger in size than the object.

Case-4: When the object is at F, the image of the object is formed at infinity.

- It cannot be shown in the diagram because rays become parallel after refraction.

Case-5: When the object is between O and F, rays after refraction diverge out and do not actually meet on the other side of the lens.

- A virtual image will be formed at a point where the rays meet when extended backward.
- These rays will appear to come from the image.
- The image will be magnified and erect.

- In case of concave lens, draw ray diagram by placing the object at different positions.
- Is real image formed on the other side of the lens?
- As rays diverge out and do not meet on the other side of the lens after refraction. Therefore, real image is not formed on the other side.
- In fact, a virtual image is formed on extending the rays backward.
- This image is always virtual, erect and smaller in size as shown in fig 10.9 at page# 142 of the textbook.

Material/Resources Required

Writing board, board markers, charts, convex lens, concave lens, objects of different size, ball point, lead pencil, scale etc.

Introduction 5 minutes

The teacher will:

- ask the students, what is focal length of lens?

  Expected response: The distance between optical centre and principal focus of the lens is called focal length.
- ask the students, what do you know about focal lengths of convex lens and concave lens?

  Expected response: focal length of the convex lens is positive while focal length of the concave lens is negative.

- ask them, which rays converge at the focus of convex lens?

  Expected response: such rays which are parallel to principal axis of convex lens converge at its focus.
- ask the students, what is convex lens?

  Expected response: such lens which converges light is called convex lens or converging lens.
- now ask them, what is concave lens?

  Expected response: such lens which diverges light is called concave lens or diverging lens.
- ask the students, do you know that images are formed by using lenses?

  Expected response: yes/no.
- say that today we will learn about "image formation using a lens by ray diagram".

Development **20 minutes**

Activity **20 minutes**

Instructions:

The teacher will tell the students:

- that a ray parallel to the principal axis after refraction from a convex lens passes through its principal focus (F).
- in case of concave lens, the refracted ray appears to come from the principal focus (F) as shown in figure 10.5 at page# 140 of the textbook.

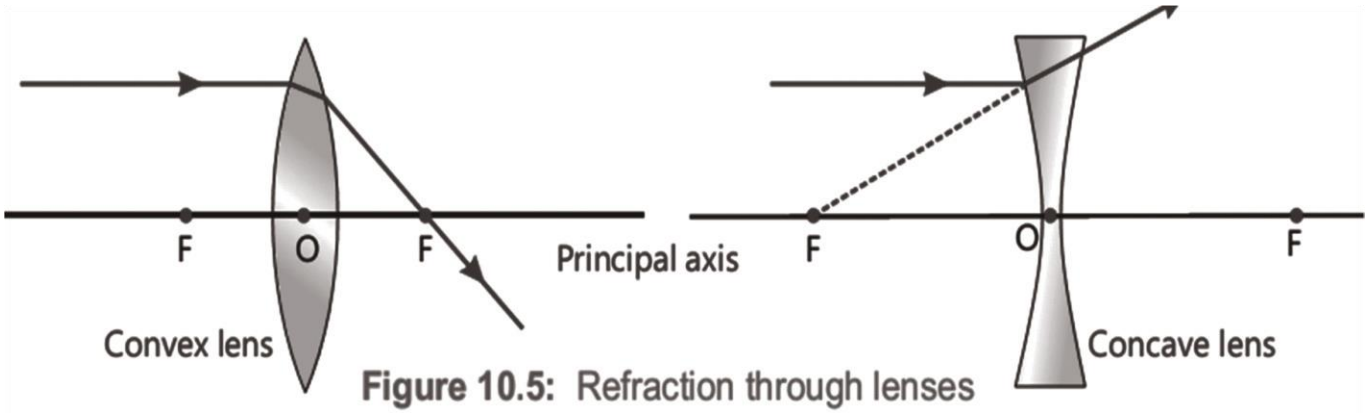


Figure 10.5: Refraction through lenses

Grade 8

Lesson 3

- that a ray incident on the convex lens after passing through its principal focus (F) becomes parallel to the principal axis after refraction.
- in case of a concave lens, the ray pointing towards the principal focus appears to come from the principal focus after refraction as shown in figure 10.6 at page#141 of the textbook.

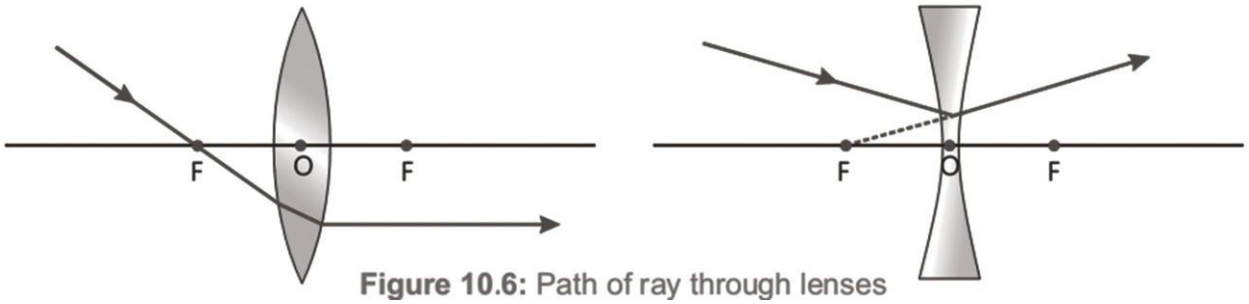


Figure 10.6: Path of ray through lenses

- that a ray passing through the optical centre of the lens goes straight without changing its direction as shown in as shown in figure 10.7 at page#141 of the textbook.

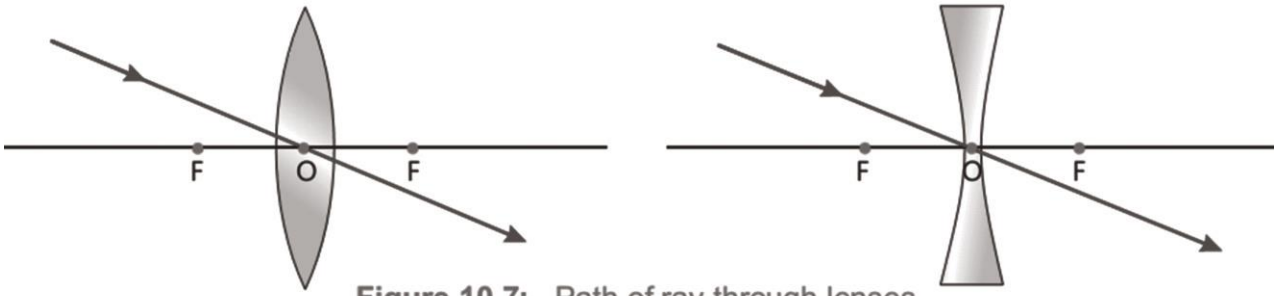


Figure 10.7: Path of ray through lenses

- The teacher will distribute the following activity sheet to each group.
- ask the students to complete the sheet.

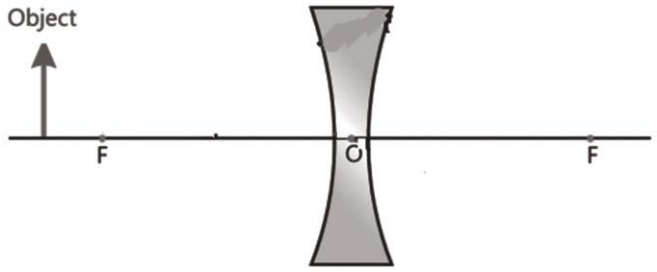
Grade 8

Lesson 3

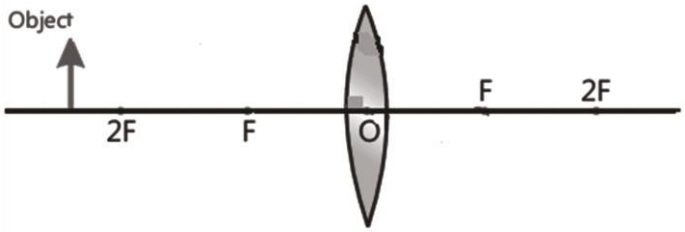
Activity Sheet

Complete the following ray diagrams.

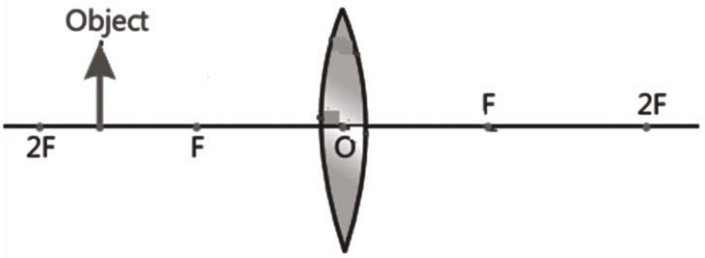
(a)



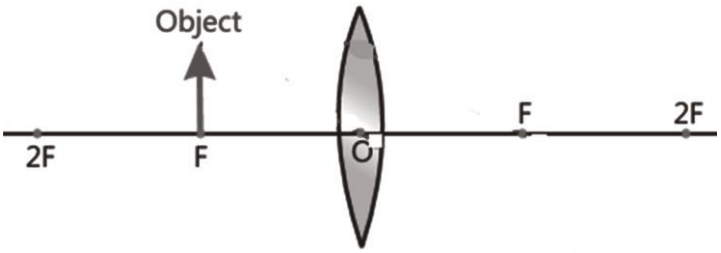
(b)



(c)



(d)



- call the students randomly from each group to present their work.
- provide feedback to students where required.

Grade 8

Lesson 3

Conclusion/Sum up — 5 minutes

At the end of lesson, the teacher will summarize the topic as:

- Convex lenses form both real and virtual images.
- Concave lenses form only virtual images.

Assessment — 5 minutes

For assessment purpose, the teacher will ask the following questions:

- Differentiate between the principal focus of convex lens and principal focus of concave lens.
- Define ray diagram when object is placed just beyond the principal focus of concave lens.

Homework — 5 minutes

Ask the students to write answers of the following questions on their notebooks.

Q.1. Differentiate between real image and virtual image.

Q.2. Draw ray diagram when object is placed inside the focal length of convex lens.

Worksheet

This lesson plan contains a work sheet (GRADE 8, G. Science, WORKSHEET # 3, Lesson 3). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish lecture. Please also make sure to explain the instructions of attempting the worksheet to the student.

Grade 8

Lesson 4

USES OF LENSES

Student Learning Outcomes

life.

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

Lenses are used for various purposes in daily life. Following are their major uses:

- Lenses are commonly used in spectacles as shown in figure 10.15 at page# 146 of the textbook.
- Convex lenses are more widely used than concave lenses.
- Convex lenses are used to magnify images.
- They are used as magnifying glasses as shown in figure 10.16 at page# 146 of the textbook.
- Contact lenses are becoming popular these days.
- These are very light and flexible.
- Contact lenses of different colours are used in eyes as shown in figure 10.17 at page# 146 of the textbook.
- Special lenses are also used in high quality cameras, telescopes, and binoculars to improve the quality of images they provide as shown in figures 10.18, 10.19 at page# 46 of the textbook.

Grade 8

Lesson 4

Material/Resources Required

Writing board, board markers, charts, convex lens, concave lens etc.

Introduction — 5 minutes

The teacher will:

- ask the students, what is the major difference between convex lens and concave lens?

  Expected response: convex lens converges light and forms real image while concave lens diverges light and forms virtual image.
- ask the students, what is plano-convex lens?

  Expected response: such lens whose one side is plane and other side is curved is called plano- convex lens.
- ask them, what are the uses of lenses in our daily life?

  Expected response: Lenses are used in spectacles in order to remove short sightedness and long sightedness.
- now ask the students, which lens do we use in spectacles?

Expected response: various responses from the students.

- ask the students, do you know about the uses of lenses other than glasses?

  Expected response: various responses from the students.
- say that today we will learn, "uses of lenses".

Development — 20 minutes

Activity — 20 minutes

The teacher will:

- divided the class into five groups
- distribute the following activity sheets to each group and tell them to complete the blank spaces given in column A, while images are given in column B.

Activity Sheet

Grade 8

Lesson 4

Column - A	Column - B
Both concave and convex lenses are used in _____.	
Concave lenses are used in_____.	
Contact lenses are used in_____.	
Both concave and convex lenses are used in_____.	
Concave lenses are used in_____.	

- call students randomly from each group to present their work.
- provide feedback to students where required.

Conclusion/Sum up **5 minutes**

- convex lenses are used in:
  - glasses for removing long sightedness.
  - cameras.
  - magnifying glass etc.
- Concave lenses are used in:
  - binoculars.
  - glasses for removing short sightedness.
  - flashlights etc.

Assessment **5 minutes**

For assessment purpose, the teacher will ask the following questions:

- Write some uses of concave lenses.
- Which lens is used by a dental surgeon?

Homework **5 minutes**

Ask students to write answers of the following questions on their notebooks.

Q.1. Differentiate between convex lens and concave lens.

Q.2. Write any four uses of special lenses.

Worksheet

This lesson plan contains a work sheet (GRADE 8, G. Science, WORKSHEET # 4, Lesson 4). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish lecture. Please also make sure to explain the instructions of attempting the worksheet to the student.

Grade 8

Lesson 5

HOW ELECTRICITY IS PRODUCED?

Student Learning Outcomes

- Design an experiment to generate electricity.

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

- No fans, computers, refrigerators, and other electrical appliances in our homes can be run without electricity.
- Electricity can be generated from many different sources by different methods. For example, dry cells and batteries produce electricity by chemical reactions of compounds.
- Electricity can also be produced by some mechanical ways.
- We can make magnets from electricity, similarly, we can also use magnets to produce electricity.
- We know that if a magnet is moved quickly through a coil of copper wire, electrons move in the wire and thus electricity is produced.
- Electricity can also be produced by rotating a coil between the opposite poles of a magnet.
- The mechanical system to produce electricity in this way is called electric generator or dynamo.
- Due to relative motion between a coil and magnet, electric current starts to flow through the coil which can be connected to an external circuit.
- The current produced by electric generators is not unidirectional. Its direction changes after an equal interval of time. Such a current is called alternating current (A.C).
- To produce electricity of higher voltage, a generator should have:

Grade 8

Lesson 5

Material/Resources Required

Charts, writing board, textbook, copper wire, steel wire, two lemons, LED, masking tape / scotch tape, flash cards, cardboard, scissors, gum stick etc.

Introduction — 5 minutes

The teacher will:

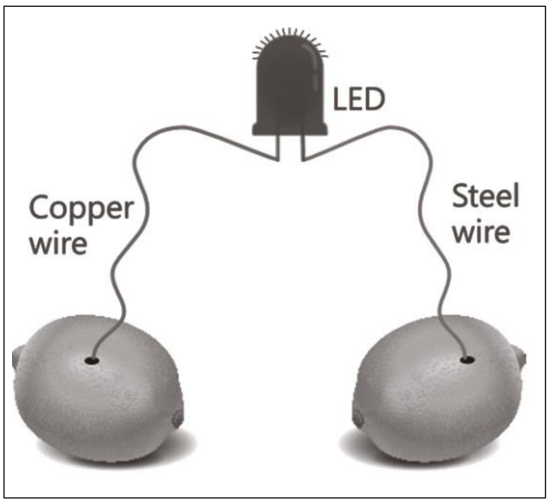
- ask the students "what is electricity?"
  Expected response: it is the form of energy used to derive different appliances.
- ask the importance of electricity.
  Expected response: it is used to run fans, computers, refrigerators, and other electrical appliances in our homes.
- ask how electricity is produced?
  Expected response: it is produced by electric generator, by cell and batteries etc.
- introduce the topic and say, today we will learn about "how electricity is produced?"

Development — 20 minutes

Activity — 20 minutes

The teacher will:

- divide the students in five groups.
- provide a copper wire, steel wire, two lemons, LED, to each group.
- ask to take two small pieces of steel and copper wires.
- say to push the wires into the lemons as shown in the figure given below.



- ask to connect other ends of the wires to the terminals of a LED.
- ask, what you observed?
- explain that LED will light up due to flow of current.
- ask each group to repeat the same activity to understand the concept well.
- appreciate the students for their correct responses and provide feedback where required.

Conclusion/Sum up **5 minutes**

At the end of lesson, the teacher will summarize the topic:

- the importance of electricity in our daily life.
- ways to generate electricity. i.e by chemical reaction, by mechanical ways, by magnet etc.
- how electricity can be generated by using magnet?
- the mechanical system to produce electricity in this way is called electric generator or dynamo.
- due to relative motion between a coil and magnet, electric current starts to flow through the coil which can be connected to an external circuit.
- recap the concept of alternating current (A.C).
- how to produce electricity of higher voltage?

Assessment **5 minutes**

Teacher will write the following questions and ask students to share their responses verbally by saying yes or no.

- Electricity can be prepared by using a magnet.
- The dry cells and batteries produce electricity by chemical reactions of compounds.
- Using a dynamo is the chemical system to produce electricity.
- What are the different methods of heat production?

Grade 8

Lesson 5

Homework **5 minutes**

Write the following questions on the board as homework and ask students to write short answers on their notebooks.

Q.1. How can we produce electricity of higher voltage?

Q.2. What is an alternate current?

Q.3. What is electric generator?

Worksheet

This lesson plan contains a worksheet # (GRADE 8, G. SCIENCE, WORKSHEET # 5 Lesson 5). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish the lecture. Please also make sure to explain the instructions of attempting the worksheet to the student.

Grade 8

Lesson 6

BICYCLE DYNAMO, A SMALL GENERATOR

Student Learning Outcomes

- Explain the working of model generator, identify the simple devices that generate electricity in daily life.

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

- A bicycle may have a dynamo to light up its lamp.
- The dynamo is a small portable generator which produces electricity from the energy of our body when we pedal a bicycle. Figure 11.3 shows a bicycle dynamo given at page # 151 of the textbook.
- The working principle of this small generator is the same as that of a big generator.
- In a dynamo the coil is held stationary while the magnet rotates inside the coil with the rotating wheel of the bicycle.

Material/Resources Required

Writing board, textbook, bicycle with dynamo, connecting wire, bulb, switch, hand pulley, wooden board, string and scissors etc.

Grade 8

Lesson 6

Introduction — 5 minutes

The teacher will:

- ask, what is the importance of electricity?
  Expected responses: it is used to run fans, computers, refrigerators, and other electrical appliances in our homes.
- ask, how can we generate electricity?
  Expected response: running generators by water, hand, or through electrolytes, solar systems etc.
- ask, have you ever used electric device containing small batteries like wall clock etc?
  Expected response: yes/no.
- inquire, can you prepare electricity?
  Expected response: yes/no.
- introduce the topic and say that we will learn about "Bicycle Dynamo, a Small Generator".

Development — 20 minutes

Activity 1 — 10 minutes

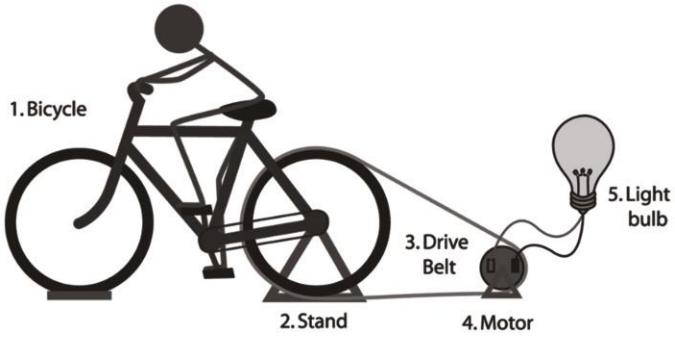
The teacher will:

- bring a bicycle fitted with dynamo in the class.
- ask a student to move the paddle of bicycle in order to move the wheel.
- As the dynamo is connected with the tire so it will rotate.
- explain that the bulb connected with the dynamo will provide light.
- prove that as the wheel of bicycle moves it will light up the bulb.
- indicates that the potential energy stored in human body is used to move the wheel, which turns the dynamo and ultimately electricity is produced.

Activity 2 **10 minutes**

The teacher will:

- set the following apparatus according to the diagram. (Dynamo, connecting wire, bulb, switch, hand pulley, wooden board, string).



- demonstrate the working of this model of electricity generator.
- ask different students to rotate the pulley and observe its effect on the bulb.
- explain:
  - when pulley is rotated, string attached to it will rotate the dynamo, this in turn will make the bulb glowing.
  - faster the pulley is rotated; more light will be produced by the bulb.
  - this experiment shows that potential energy provided by the human body is used to rotate pulley and dynamo converts this energy into electrical energy.

Conclusion/Sum up **5 minutes**

- At the end of lesson, the teacher will summarize the topic as bicycle have dynamo to light up its lamp, it is a small generator which works like a big generator.
- The dynamo is a small portable generator which produces electricity from the energy of our body when we pedal a bicycle.
- In a dynamo, the coil is held stationary while the magnet rotates inside the coil with the rotating wheel of the bicycle.

Grade 8

Lesson 6

Assessment **5 minutes**

For assessment purpose, the teacher will ask the following questions:

- What is the use of dynamo?
- Write the principal of working of a small dynamo.

Homework **5 minutes**

The teacher will write the following questions on the board as homework and ask the students to write their answers on their notebooks.

Q.1. Define dynamo.

Q.2. Write a note on the working of a dynamo.

Worksheet

This lesson plan contains a worksheet # (GRADE 8, G. SCIENCE, WORKSHEET # 6 Lesson 6). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish the lecture. Please also make sure to explain the instructions of attempting the worksheet to the student.

Grade 8

Lesson 7

POWER PLANT GENERATOR

Student Learning Outcomes

- Design and demonstrate the working of power station.

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

- Electricity is mostly generated in places called power stations.
- In a power plant generator, the coils are kept stationary while magnet is rotated inside the coil.
- The stationary coil is called stator while the moving magnet is called rotor.
- The running water of a stream or a river is used to run generator for producing electricity.
- Similarly, fuels like coal, oil or gas are also used to run generators. For example, in coal-fired electricity generation, the burning coal heats water in a boiler, producing steam.
- The steam pushes the blades of a turbine fixed at the lower end of the rotor shaft.
- As the rotor spins inside the stator, electric power is generated.
- In a hydro power station, water falls from a high reservoir (lake) through the tunnels.
- The falling water turns the blades of a turbine fixed to the lower end of the rotor shaft.
- The rotating shaft turns the rotor, which generates electricity in the stator coils.
- The electricity is transmitted to various parts of the country through power transmission system.
- Hydro power generation is very economical and environmental friendly.

Grade 8

Lesson 7

Material/Resources Required

Writing board, textbook, masking tape, flashcard, charts, cardboard, board markers.

Introduction — 5 minutes

The teacher will:

- show the picture of a hydropower generation (taken from page # 155 of the textbook). to the students and ask them:
  - what is happening in the picture?
  - what is the function of turbine?
- show the picture of a power station (taken from page # 155 of the textbook) and ask the following question:
  - from where does the electrical energy come to our houses?

  Expected response: from a power station.
- ask about the function of a generator.

  Expected response: it is used to produce electricity.
- ask that what is a dynamo?

  Expected response: a dynamo is a device which converts mechanical energy into electrical energy.
- ask the students, do you know about the working of power station?

  Expected response: yes/no.
- introduce the topic and say, today we will learn about "power plant generation".

Development — 20 minutes

Activity — 20 minutes

The teacher will:

- divide the class into five groups.
- ask students to read the power plant generators given on page # 151 of their textbook.
- circulate the following sheet to each group.
- ask to complete the activity sheet according their understanding.

Grade 8

Lesson 7

1.	The electricity is transmitted to various parts of the country through power _____system.
2.	In a _____water falls from a high reservoir (lake) through the tunnels.
3.	The stationary coil is called _____while the moving magnet is called _____.
4.	Fuels like coal, oil or gas are also used to run _____.
5.	Hydro power generation is very economical and _____friendly.

- ask one student from each group to present their work in front of the class.
- appreciate students for their correct responses and provide feedback where required.

Conclusion/Sum up **5 minutes**

The teacher will:

- At the end of lesson, the teacher will summarize the topic as:
- Electricity generation is the process of generating electrical energy from other forms of energy.
- We need electricity in our daily life.
- We generate electricity as we don't get it as ready item.
- Dynamo converts the mechanical energy into electrical energy.
- Electricity is generated by using the energy from different sources i.e. fuels, coal, wind, hydroelectricity, solar, nuclear, thermal power, tidal power.
- Hydro-electric power stations generate electricity using water trapped behind the dams.

Assessment **5 minutes**

For assessment purpose, the teacher will ask the following questions:

- Mostly, from where do we generate electricity?
- What is the name of stationary coil?
- What do we call the moving magnet?

Grade 8

Lesson 7

Homework **5 minutes**

The teacher will write the following questions on the writing board as homework and ask the students to write their answers on their notebooks.

Q.1. Why do we need electricity?

Q.2. What are power stations?

Q.3. Define a rotor.

Worksheet

This lesson plan contains a worksheet # (GRADE 8, SCIENCE, WORKSHEET # 7 Lesson 7). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish the lecture. Please also make sure to explain the instructions of attempting the worksheet to the student.

Grade 8

Lesson 8

TELESCOPE, REFRACTING TELESCOPE, REFLECTING TELESCOPE

Student Learning Outcomes

- Describe development of tools and technologies used in space exploration

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

- The instrument which is used for observing distant objects is called telescope.
- Galileo was the first person who invented and used telescope in 1610.
- The invention of telescope opened the gate way to scientific study of space and heavenly bodies.
- The modern telescopes are much bigger and equipped with the latest accessories.
- Optical telescopes are of two basic types, i.e., refracting telescope and reflecting telescope.
- A simple refracting telescope consists of a long tube fitted with two lenses, one at each end of the tube.
- The lens which refracts the light coming from distant objects at a point (focus) is called objective lens.
- The lens through which the image formed by the objective lens is seen is called eyepiece.
- The main parts of a reflecting telescope are a large concave mirror, an eyepiece and a tube that holds them.
- The objective mirror which is a concave mirror reflects and converges the light on an eyepiece directly or through another reflecting mirror.

- The eyepiece magnifies the image formed by the objective mirror.
- Reflecting telescope can be made much larger than a refracting telescope, so that a better and bright image can be seen.
- Ground based telescopes have the disadvantage that dim light coming from stars passes through atmosphere, and the images so formed are not clear.
- To overcome this problem, telescopes have been sent into space.
- Hubble space telescope is the first space based reflecting telescope launched in 1990.
- It orbits around the Earth at a height of 600 Km and works round the clock.
- It has taken clear pictures of galaxies, billions of kilometers away.

Material/Resources Required

A chart consists of a picture taken from textbook page # 161, writing board, textbook, mirror, hand mirror, magnifying lens.

Introduction **5 minutes**

The teacher will:

- ask students, have you ever used binoculars?

  Expected response: yes, we have used it for observing distance objects.

- ask the students, have you ever observed stars at night?

  Expected response: yes, we have observed many times.

- ask them the difference between binoculars and telescope.

  Expected response: telescope is used to observe heavenly objects.

- announce the topic and will say that today we will learn about "telescope and its types."

Grade 8

Lesson 8

Development **20 minutes**

Activity **20 minutes**

The teacher will:

- divide the class in five groups.
- instruct the students to use a makeup mirror, and a hand mirror.
- ask a student to place the makeup mirror near the window so that the moon and stars or any other object can be reflected in it.
- ask another student to hold the hand mirror to see a reflection of the makeup mirror in it.
- ask to the third student of the group to use a magnifying lens to see the reflection in the hand mirror.
- ask to observe this reflection of stars and moon through a magnifying glass.
- explain that:
  - the observation of this magnifying glass will be same as the working of some ordinary telescope.
  - how telescope works and convex lenses are used in them to locate the far away things by doing the above activity.
- ask other groups to repeat the same activity to understand the concept well.
- appreciate the students for their correct responses and provide feedback where required.

Conclusion/Sum up **5 minutes**

At the end of lesson, the teacher will summarize the following:

- telescope and its types.
- the first invented telescope.
- the difference between refracting telescope and reflecting telescope.
- a simple refracting telescope consists of a long tube fitted with two lenses, one at each end of the tube.
- the difference between objective lens and eyepiece.
- disadvantage of ground-based telescopes and way to overcome it.
- Hubble space telescope.

Grade 8

Lesson 8

Assessment **5 minutes**

The teacher will ask the following questions:

- Who invented the first telescope?
- Name the two types of optical telescopes.
- When was Hubble space telescope launched?

Homework **5 minutes**

Write the following questions on writing board as homework and ask the students to write their answers on their notebooks.

Q.1. What is a telescope?

Q.2. Differentiate between refracting and reflecting telescope.

Q.3. What is the disadvantage of ground-based telescopes?

Worksheet

This lesson plan contains a worksheet (GRADE 8, SCIENCE, WORKSHEET # 8, Lesson Plan # 8). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish lesson. Please also make sure to explain the instructions of attempting the worksheet to the students.

Grade 8

Lesson 9

SPECTROSCOPE, SPACE CRAFTS

Student Learning Outcomes

- Describe development of tools and technologies used in space exploration.

Duration/Number of Period/s

40 minutes / period-1

Period 1 — 40 minutes

Information for Teachers

Spectroscopes

- A spectroscope is an instrument which is used to examine different wavelengths (colours) of a light. It consists of a series of prisms that split white light into different colours.
- The set of different colours obtained in this way is called spectrum.
- Spectroscope also measures the wavelengths of different colours of the spectrum as shown in figure 12.4 at page # 162 of the textbook.
- The wavelengths of light coming from the stars help the scientists to know about the elements and compounds present in the stars.
- Spectroscopes are mostly attached with the telescopes.

Spacecraft

- Spacecraft is a vehicle designed to travel in space as shown in figure 12.5 at page # 163 of the textbook.
- It is used for different purposes like communication, Earth's observation, meteorology, navigation, planetary exploration and transportation of humans and cargo in space.
- There are two major classes of spacecraft: robotic space craft and manned spacecraft.
- Robotic spacecraft are sent into space for collection of data about space, planets, and other heavenly bodies such as asteroids. A robotic spacecraft is controlled from the centre

on Earth.

Grade 8

Lesson 9

- Voyager-I and voyager-II were two robotic spacecrafts which were used for collecting data about planets Mars and Jupiter. Manned spacecrafts carry humans and equipment to space.
- These spacecrafts are larger and have specially built compartments which have the facilities necessary for human survival such as oxygen, pressurized cabins, food, water, and specially built bathrooms.
- They also have special structure to protect from dangerous radiations which are very intense in space.

Material/Resources Required

Writing board, board marker, textbook, pictures of spectroscope and space craft (if possible), six activity sheets.

Introduction 5 minutes

The teacher will:

- ask the students, how can you see the objects those are far away?
  Expected response: we can see them with the help binocular.
- ask them, what is the phenomenon used in binocular?
  Expected response: special arrangement of lenses is used to see the objects those are far way.
- ask, do you know about prism?
  Expected response: an instrument which is used to split the light into seven different colors is called as prism.
- ask them, do you know any objects which were used to invent space technologies?
  Expected response: yes, we know telescope, spacecraft, space shuttle etc.
- say, today we will learn about " Spectroscope, Space crafts".

Grade 8

Lesson 9

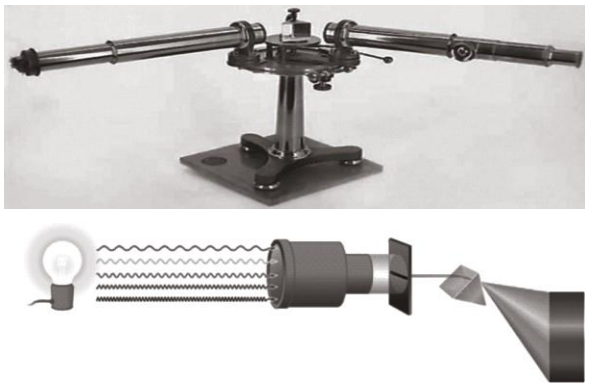
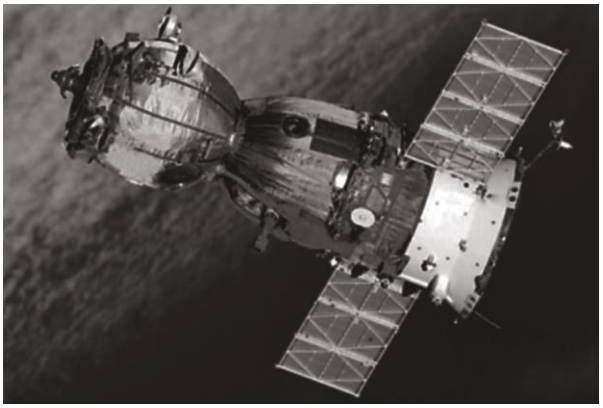
Development **20 minutes**

Activity **20 minutes**

The teacher will:

- divide the students into six groups.
- distribute the following activity sheets to the groups. (one per group).
- ask the students to complete the sheet. Students may take help from the textbook.
- tell students to see the figure given below and write the descriptions after developing understanding.

Activity sheet

<table>
<tr>
<td>  </td>
<td>  </td>
</tr>
<tr>
<td>What is the function of spectroscope?
_____
_____
It consists of a series of _____that split white light into different colours.
The set of different colours obtained in this way is called _____.
Spectroscope also measures the
_____.</td>
<td>What is the function of space craft?
_____
_____
There are two major classes of spacecraft;
_____space craft and
_____spacecraft.
For what purpose Robotic spacecraft are sent into space?
_____
Give examples of spacecrafts.
_____</td>
</tr>
</table>

- call the students randomly from each group to present their work.
- reinforce the topic and explain the functioning of spacecraft and spectroscope.
- provide feedback to students where required.

Conclusion/Sum up **5 minutes**

- Recap the concept of spectroscope as it has the wavelengths of light coming from the stars that help the scientists to know about the elements and compounds present in the stars.
- Spectroscopes are mostly attached with the telescopes.
- Conclude, spacecrafts are larger and have specially built compartments which have the facilities necessary for human survival such as oxygen, pressurized cabins, food, water, and specially built bathrooms. They also have special structure to protect from dangerous radiations which are very intense in space.

Assessment **5 minutes**

For assessment purpose, the teacher will ask the following questions:

- Which functions are performed by spectroscope?
- Define spectrum.
- What are the types of spacecrafts?

Homework **5 minutes**

Ask the students to write answers of the following questions in their notebooks and show to the class when they come next day.

Q.1. Briefly explain the functions of spectroscope.

Q.2. Write a note on spacecrafts.

Worksheet

This lesson plan contains a worksheet (GRADE 8, SCIENCE, WORKSHEET # 9, Lesson Plan # 9). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish lesson. Please also make sure to explain the instructions of attempting the worksheet to the students.

Grade 8

Lesson 10

SPACE STATION, SPACE SHUTTLE

Student Learning Outcomes

- Analyze the benefits generated by the technology of the space exploration.

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

Space Stations

- For a long stay in space or for performing experiments in space, large spacecraft called space stations are used as shown in figure 12.6 at page # 163 of the textbook.
- A space station is built in space by carrying its many small parts to space and then assembling them there.
- It has more facilities for prolonged living in space. It may have television for entertainment, bags for sleeping, exercise machine and kitchen for fresh food.
- One important part of a space station is the scientific laboratory where astronauts perform such experiments that cannot be done on Earth because of its gravity.
- Now-a-days a large space station orbits the Earth.
- Russians, Americans, and other scientists jointly work in this space station. This is called international space station.

Space shuttle

- Manned space craft is specially developed which can be used many times.
- It is sent into space with the help of a rocket as shown in figure 12.7 at page # 163 of the textbook.
- It carries scientists and equipment. It docks with the space station to transfer its load.
- After performing its task, it returns and lands back on Earth like an Aeroplan.

- If there is no expansion gap, bridges may get damaged.

Grade 8

Lesson 10

Material/Resources Required

Writing board, board marker, textbook, four activity sheets, small paper pieces (chits), pictures of space stations and space shuttles (if possible).

Introduction — 5 minutes

The teacher will:

- ask the students, how do the scientists go to space?
  Expected response: with the help of space crafts, spaceships and space shuttles.
- ask them, where do the astronomers live in the space and put their luggage?
  Expected response: they have some rooms or stations.
- tell, there are some stations called as space stations but now think how does it work?
  Expected response: it has some machines and mechanisms to support the life over there.
- ask, what are the objects used to invent space technologies?
  Expected response: yes, we know telescope, spacecraft, space shuttle etc.
- say that today we will learn about " Space station and Space shuttle".

Development — 20 minutes

Activity — 20 minutes

The teacher will:

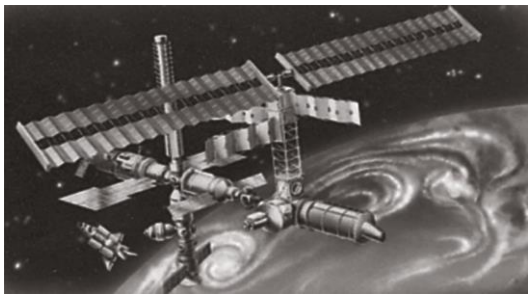
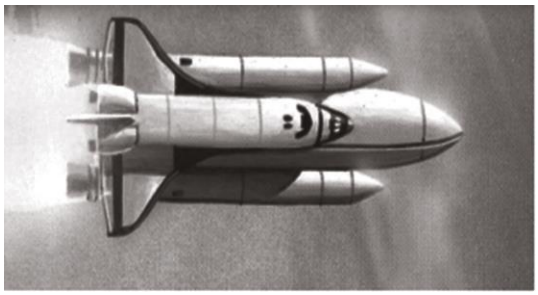
- ask the students to work in four groups.
- provide an activity sheet and paper pieces (chits) to each group.
- tell the students that relevant information about space station and space shuttle are given mixed.
- ask them to read the available information, discuss it among the groups.
- ask each group to select the most appropriate response given below and write it in Column A or Column B.

Grade 8

Lesson 10

Available Information About Space Station and Space Shutle
It helps us to stay longer time in the space.
It carries scientists and equipment.
Manned space craft is specially developed which can be used many times.
It is built in the space by assembling small parts in the space.
It is sent into space with the help of a rocket.
After performing its task, it returns and lands back on Earth like an Aeroplan.
It is a scientific laboratory where astronauts perform such experiments that cannot be done on Earth because of its gravity.
It docks with the space station to transfer its load.

Activity Sheet

Column - A	Column - B
 **Space station**	 **Space shutle**

- call students randomly from each group to present their work.
- reinforce the topic and explain the function of space station and space shuttle.
- provide feedback to students where required.

Conclusion/Sum up **5 minutes**

- Recap the concept of space station and say, it helps us to stay longer time in the space.
- It is built by assembling small parts in the space, it helps in the experimentation and team work as international space station.
- Conclude that manned space craft shuttle is specially developed which can be used many times.
- It carries scientists and equipment. It docks with the space station to transfer its load.

Assessment **5 minutes**

The teacher will ask following questions to assess the students' understanding.

- Which functions are performed by space station?
- Define international space station.
- What are the functions of space shuttle?

Homework **5 minutes**

Teacher will ask the students to write answers to following questions in their notebooks and show to the class when they will come the next day.

Q.1. Briefly explain the functions of space station.

Q.2. Write a note on space shuttle.

Worksheet

This lesson plan contains a worksheet (GRADE 8, SCIENCE, WORKSHEET # 10, Lesson Plan # 10). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish lesson. Please also make sure to explain the instructions of attempting the worksheet to the students.

Grade 8

Lesson 11

PROBLEMS CREATED BY SPACE EXPLORATION AND THEIR SOLUTION

Student Learning Outcomes

- Suggest the ways to solve the problems that have resulted from space exploration.

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

- Space sickness, effects of weightlessness, conditions resulting from exposure to radiation and many unwanted side effects are the problems created during the stay in space.
- Pollution caused by burning of rocket fuel and disposal of rocket parts, etc. is one of the major problems created by space exploration.
- Hazards for the space crew on missions are the main problems. Many deaths have resulted during the manned spaceflights.
- Space scientists and engineers need continuous work to improve safety in space missions.
- Skylab fell from its orbit to Earth in 1979. This type of incidences could be dangerous for population. So, Skylab should be properly maintained.
- Space programs are very costly. These are causing economic burden on common man.
- Involvement of private sector in missions could be a possible solution.

Material/Resources Required

Writing board, board markers, textbook, four activity sheets.

Grade 8

Lesson 11

Introduction — 5 minutes

The teacher will:

- ask the students, do you think, there is something that is dangerous in the space journey?

  Expected response: yes, there are several hazards as, bursting of craft, station or even death of astronomers.
- ask them, what measurements should be adapted to reduce the risk?

  Expected response: wear proper dress, use safe air crafts etc.
- tell some other dangers are also present as environmental or weather conditions etc.
- ask, have you ever heard about space accidents?

  Expected response: yes, death of astronomers and bursting of air crafts etc.
- say that today we will learn about " Problems created by space exploration and their solution".

Development — 20 minutes

Activity — 20 minutes

The teacher will:

- address the major problems of space exploration.
- explain there are five critical issues in each space exploration as;
  - sickness or radiation exposure,
  - environmental,
  - burning of space crafts,
  - sky lab fall accident,
  - and expensive cost.
- ask the students to work in four groups.
- provide an activity sheet and ask them to complete the activity sheet after developing their understanding.
- tell them that they may take help from their textbook.

Grade 8

Lesson 11

Activity Sheet

Q.1. Fill in the blanks with a suitable word from the list given below.

List: (radiation, disposal, missions, engineers, weightlessness, rocket).

1)- Space sickness, effects of_____conditions resulting from exposure to _____and many unwanted side effects are the problems created during the stay in space.

2)- Pollution caused by burning of _____fuel and _dis_____of rocket parts, etc. is one of the major problems created by space exploration.

3)- there are several hazards for the space crew on _____. Many deaths have resulted during the manned spaceflights.

4)- Space scientists and _____need continuous work to improve safety in space missions.

Q.2. Give short answers to the following questions:

1)- What should you do against incidents like Skylab's fall?

_____

_____

_____

2)- Space programs are costly, what should be the solution?

_____

_____

_____

_____

- call the students randomly from each group to present their work.
- reinforce the topic and explain the hazards and issues of space exploration and their solutions.
- provide feedback to students on their work.

Grade 8

Lesson 11

Conclusion/Sum up — 5 minutes

The teacher will:

- recap the concept that space exploration has many hazards, and these issues should be resolved.
- conclude, Skylab fell from its orbit to Earth in 1979. This type of incidents could be dangerous for population. So, sky labs should be properly maintained.
- Space programs are very costly. These are causing economic burden on scientists.
- Involvement of private sector in missions could be a possible solution.

Assessment — 5 minutes

For assessment purpose, the teacher will ask the following questions:

- Enlist the hazards which occur during space exploration.
- Write all possible solution of space experiment.

Homework — 5 minutes

Teacher will ask the students to write answers to following questions in their notebooks and show to the class when they come the next day.

Q.1. Briefly explain the problems arise due to space exploration.

Q.2. Write down the possible solution of problems arise due to space exploration.

Worksheet

This lesson plan contains a worksheet (GRADE 8, SCIENCE, WORKSHEET # 11, Lesson Plan # 11). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish lesson. Please also make sure to explain the instructions of attempting the worksheet to the students.

Grade 8

Lesson 12

NEW TECHNOLOGIES DEVELOPED ON THE EARTH AS RESULT OF SPACE EXPLORATION

Student Learning Outcomes

- Identify new technologies developed on the earth that have developed as result of the development of space technology.

Duration/Number of Period/s

40 minutes /1 period

Period 1 — 40 minutes

Information for Teachers

- To reiterate some of the new technologies developed on the Earth because of space exploration is listed below:
- Special types of metal alloys and ceramic materials developed for rocket engines and space shuttles can withstand very high temperature and pressure. These are now being used in Jet engines.
- Similarly, special foam seats developed for spacecrafts are now being used in Aeroplan and car seats.
- Solar cells were originally developed to provide electricity to spacecrafts. Millions of them are being installed on the Earth now-a-days to produce almost free electricity from sunlight.
- In case of illness, astronauts have difficulty in swallowing medicine pills in space. Special medicines have been developed for use in space. These medicines directly pass through the skin and enter the body of the patient. These medicines are now being manufactured for the patient on the Earth who finds it difficult to swallow the pills.
- Special sensors and computers were developed for monitoring the physical conditions of astronauts such as pulse rate, blood pressure, blood sugar, etc.
- ·Now-a-days the same technology is used to monitor patients present at in-accessible areas, with the help of satellite communications.
- ·A doctor in an advanced city hospital can check a patient who is far away in a remote village

and suggest medicine. By this method doctor can even perform surgical operations on remote patients.

Grade 8

Lesson 12

Material/Resources Required

Writing board, board markers, textbook, small pieces of paper or chits for activity.

Introduction 5 minutes

The teacher will:

- ask the students, what are the problems of space exploration?

  Expected response: there are several hazards as, bursting of craft, station or even death of astronomers, environmental issues, and economic issues.

- ask them, what measurements should be adapted to reduce the risk?

  Expected response: wear proper dress, use good material in construction of aircrafts, maintain medical measures in the crafts etc.

- tell some other dangers are also present as bursting of aircrafts, now think how this problem can be solved?

  Expected response: aircrafts and air stations should be properly maintained and specially monitored quality of building material.

- ask, how environmental issues can be resolved in space exploration?

  Expected response: radiation free air crafts, and properly maintained space stations are helpful in this regard.

- say that today we will learn about "**New technologies developed on the earth as result of space exploration".**

Development 20 minutes

Activity 20 minutes

The teacher will:

- arrange gallery walk.
- cut the following activity sheet into small chits (each chit has one characteristic) and paste these chits into different portions of corridor.
- ask the students to read these chits and write it on their notebooks.

Grade 8

Lesson 12

Activity Sheet

Special types of metal alloys and ceramic materials developed for rocket engines and space shuttles can withstand very high temperature and pressure. These are now being used in Jet engines.
Similarly, special foam seats developed for spacecrafts are now being used in Aeroplan and car seats.
Solar cells were originally developed to provide electricity to spacecrafts. Millions of them are being installed on the Earth now-a-days to produce almost free electricity from sunlight.
In case of illness, astronauts have difficulty in swallowing medicine pills in space. Special medicines have been developed for use in space. These medicines, directly pass through the skin and enter the body of the patient.
Special sensors and computers were developed for monitoring the physical conditions of astronauts such as pulse rate, blood pressure, blood sugar, etc. Now-a-days the same technology is used to monitor patients present at in-accessible areas, with the help of satellite communications.
A doctor in an advanced city hospital can check a patient who is far away in a remote village and suggest medicine for him. By this method doctor can even perform surgical operations on remote patients.

- ask the students to work in four groups.
- ask them to match their writing with the topic on the textbook at page # OF TEXT BOOK and develop their understandings.
- call students randomly from each group to present their work.
- reinforce the topic and explain modern technologies to make the space exploration safe.
- provide feedback to students on their work.

Grade 8

Lesson 12

Conclusion/Sum up — 5 minutes

The teacher will:

- recap the concept that specials material should be used for the manufacturing of space crafts, specials seats for comfortable journey, special medicine are new techniques those are used now a days.
- conclude, special sensors and computers were developed for monitoring the physical conditions of astronauts such as pulse rate, blood pressure, blood sugar, etc.
- Now-a-days the same technology is used to monitor patients present at in-accessible areas, with the help of satellite communications.

Assessment — 5 minutes

For assessment purpose, the teacher will ask the following questions:

- What should astronomers do to treat illness?
- What astronomers have done yet to make the space journey safe?

Homework — 5 minutes

Teacher will ask the students to write answers to following questions in their notebooks and show it to the class when they come the next day.

Q.1. Briefly explain how astronomers have resolved the medical issues of space journey.

Q.2. Write down the possible solution to make the crafts safer.

Worksheet

This lesson plan contains a worksheet (GRADE 8, SCIENCE, WORKSHEET # 12, Lesson Plan # 12). Please make sure that you obtain the required number of copies before the start of the class and every student is given a worksheet before you finish lesson. Please also make sure to explain the instructions of attempting the worksheet to the students.