Government of Meghalaya
Education Department

DERT
DIRECTORATE OF EDUCATIONAL
RESEARCH & TRAINING

Reach to Teach
FOUNDATION

CM IMPACT
Meghalaya Learning Enhancement Programme

IMPACT

CHIEF MINISTER'S INITIATIVE TO MAXIMIZE PASS ACHIEVEMENT AND CLASSROOM TRIUMPH

CLASS 10

Achieving grade-appropriate learning levels

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Class 10

INDEX

Note for Teachers

Dear Teacher,

The **Meghalaya Class Readiness Programme MCRP**, implemented at the start of this academic year was a **bridge course** which focused on enhancing the learning outcomes and competencies of the previous classes to help achieve the current grade-level outcomes. We sincerely appreciate your dedication, hard work, and commitment to this initiative, ensuring every student moves forward in their learning journey. The MCRP plays a crucial role in ensuring students, particularly those struggling, acquire the necessary competencies to progress through their classes without difficulty.

On completion of the MCRP, in order to assist you in conducting regular classes effectively and to keep the momentum alive, chapter-wise activities will be shared with you throughout the academic year. This will help students attain grade-level learning through experiential, activity-based elements linked to learning outcomes and competencies, and will aid you in reinforcing concepts covered in each chapter. This approach will also encourage students to reflect on and apply what they learn.

While you will be teaching the subject as per your timetable and syllabus, it is suggested that you conduct the given activities along with the chapter you are teaching from the NCERT textbook.

The following are some important points that will help you understand the usage of the modules in a better manner:

- The modules provide **suggestive activities** you can undertake while teaching a chapter. These activities are aligned with the theme/concepts of the chapter and have experiential learning at their core. These are also aligned to specific learning outcomes and competencies, thus helping your students acquire certain skills.

- At the end of each chapter, a competency-based assessment is included to help you identify your students' learning levels and determine areas that may require additional revision. These assessment activities are **aligned with the formative assessments suggested in the Assessment Blueprint** (revised in February 2025).

- A learning level tracker (as given during MCRP) is provided. Please use this to monitor individual students' achievement of learning outcomes and competencies. This will give you a clear picture of how your students are doing and what areas they need extra support in.

If you have any queries, please contact our helpline number: **+91 9205666274.**

Wishing you an engaging and fruitful academic year ahead! Here's hoping your students become independent learners and your classroom interactions remain exciting, learning outcome-driven and without additional burden to you.

Meghalaya Learning Enhancement Programme

ENGLISH

UNIT : 1
Chapters: A Letter to God, Fire and Ice

Activity 1 The Known and the Unknown

35 mins

Instructions

- Divide the class into groups. Each group can be of 4-5 students.
- Print out the following passage and distribute it in groups. If you are unable to print it, you may write the passage on the board.
- Next, ask students to read the passage. You may explain the passage in the local language if required.
- Based on their reading, ask the students to answer the questions below by writing in their notebooks after discussing them in their groups.

The Known and the Unknown

Faith is often described as trust in something beyond our understanding, like a belief in a higher power or a sense of purpose. It can be comforting, giving people hope in difficult times. Ironically, many people find it easier to trust in the unknown, like fate or the universe, than to trust other humans. Trusting in others can feel risky, while trusting in something intangible feels safer, even if it cannot be proved. Some may believe in this unknown force without questioning it, yet fail to see the importance of building trust with those around them. It's a curious balance – faith in something we cannot see, versus the risk of relying on the people we can.

Choose the correct answers from the options given:

A. According to the passage, why do people often find it easier to trust the unknown?
   a) It is easier to understand
   b) Trusting in the unknown requires less effort
   c) Trusting in something intangible does not feel risky
   d) The unknown is always right

B. What is the irony mentioned in the passage?
   a) People trust their friends more than fate
   b) People trust in the unknown more than they trust other humans
   c) Trusting others is always easier than trusting fate
   d) Faith is unnecessary in today's world

C. What is implied by the phrase "a curious balance" in the passage?
   a) There is no real difference between trusting the unknown and trusting humans
   b) People have to carefully decide whether to trust the unknown or others
   c) It is easy to trust either the unknown or other humans
   d) Faith in the unknown leads to stronger human relationships

Answer the following questions:

D. How does the passage describe the relationship between faith and trusting humans?

_____
_____
_____
_____

E. What do you think the passage suggests about the nature of trust itself?

_____
_____
_____
_____

F. Do you think the passage's argument about trusting the unknown versus trusting others is still relevant in today's society? Why or why not?

_____
_____
_____
_____

Activity 2 Determiners

35 mins

Instructions

- Explain the concept of Determiners through the notes below. Tell the students that in this activity, the focus will be on 4 kinds of Determiners - Articles, Demonstrative, Possessive, and Quantifiers.

  - ***Define determiners -*** *"Words used before a noun to specify it."*

    Explain their functions with specific examples. - "This book" specifies a particular book. "Some pens" indicate an unspecified number.
  - ***Introduce the following determiners:***

    Articles *(a, an, the) - explain the differences between indefinite (a, an) and definite (the) articles. I need a pencil. (any pencil) I need the pencil. (a specific pencil)*

    Demonstratives (this, that, these, those) - show the uses related to distance and number with examples. - this car *(near, singular) those bikes (far, plural)*

    Possessives (my, your, his, her, our, their) - relate to ownership. This is my dog.

    Quantifiers (some, much, many, a few, any, several, little, all, etc.) - specify quantity.

    I have some money. He does not have any notebooks.

- Write the following sentences on the board, and ask students to rewrite them using the correct determiners:

A. There is few water in the glass.
B. He has a oranges in his lunchbox.
C. I bought much books from the fair.
D. She found any mistakes in the assignment.

E. There are little students in the classroom today.
F. We need an hour to complete this task.
G. They have many information about the project.
H. He drank a juice in the morning.
I. I have some friend in this city.
J. She put much sugar in her tea.

Activity 3 Formal Letter Writing

35 mins

Instructions

- Begin by explaining the types of formal letters in communication.
  - ***Letter of Application*** - used when applying for a job, internship, or any position. It includes the applicant's qualifications, experience, and interest in the position.
  - ***Letter of Complaint*** - written to express dissatisfaction about a product, service, or experience, requesting a resolution.
  - ***Letter of Request*** - written to request something, such as permission, information, or a favour.
  - ***Letter of Invitation*** - written to invite someone to an event or occasion, such as a meeting, party, or ceremony.
  - ***Letter of Thanks*** - a letter expressing gratitude, such as thanking someone for a gift or help.
  - ***Letter of Apology*** - written to apologise for a mistake, misunderstanding, or an unfortunate situation.
  - ***Letter of Congratulation*** - used to congratulate someone on an achievement or milestone, such as passing exams or winning a competition.
  - ***Letter to the Editor*** - written to express an opinion on a public issue, usually intended for publication in a newspaper or magazine.
  - ***Letter of Recommendation*** - written by a teacher, employer, or mentor to recommend someone for a job, scholarship, or opportunity.
  - ***Formal Letter of Inquiry*** - written to ask for information or clarification about a subject, product, or service.
- Discuss on a basic format for formal letters.
  - **Sender's Address** (Top left) - the address of the person writing the letter. It usually includes the house number, street, city, and postal code. This can be omitted if the letter is printed on letterhead.
  - **Date** (Below sender's address) - the date when the letter is being written.
  - **Recipient's Address** (Left-hand side) - the address of the person or organisation to whom the letter is being sent. Include the title, name, position (if applicable), and full address.
  - **Salutation** (Greeting) - begin with a formal greeting. Use "Dear" followed by the person's title and last name. If you do not know the name of the person, use "Dear Sir/Madam."
  - **Body of the Letter** - this is the main part of the letter, where the purpose is explained. It is often divided into paragraphs:
  - **Introduction**: state the purpose of your letter.
  - **Main content**: provide details or explanations related to the purpose of the letter.
  - **Conclusion**: summarise or state the action you would like to be taken or the response you expect.
  - **Closing** - use a formal closing phrase such as "Yours sincerely" or "Yours faithfully".

- **Signature** - after the closing, leave space for your signature (if writing by hand), followed by your name and title (if applicable).
- **Enclosures** (If applicable) - if you are including any additional documents with the letter, mention them here.

- Conduct a class discussion and ask students if they have ever written a formal letter to somebody, and if they have any questions regarding the types of formal letters and the format.
- Ask students to imagine that they feel the library at their school needs more books or resources. Ask them to write a letter to the principal requesting to get more books, magazines, or digital resources related to their areas of interest.

UNIT: 1 Assessment

35 mins

Section A (Literature)

Choose the correct answer from the given options:

1. Why did Lencho write a letter to God?
   a) To complain about the bad weather
   b) To seek help after his crops were destroyed by hail
   c) To request a new plough
   d) To thank God for the rain
2. What was the amount Lencho asked for in his letter to God?
   a) Fifty pesos
   b) One hundred pesos
   c) Twenty pesos
   d) Ten pesos
3. What is the central theme of the poem "Fire and Ice"?
   a) The destructive power of nature
   b) The conflict between fire and ice
   c) The end of the world and human emotions
   d) The beauty of contrasting elements
4. According to the poem, which of the following is compared to fire?
   a) Hatred
   b) Love
   c) Desire
   d) Jealousy

Read the following extracts and answer the questions:

Extract 1

The house — the only one in the entire valley — sat on the crest of a low hill. From this height one could see the river and the field of ripe corn dotted with the flowers that always promised a good harvest. The only thing the earth needed was a downpour or at least a shower. Throughout the morning Lencho — who knew his fields intimately — had done nothing else but see the sky towards the north-east. Now we're really going to get some water, woman.' The woman who was preparing supper, replied, 'Yes, God willing.'

5. How does this description reflect Lencho's hopes for the harvest?
   a) It shows Lencho's faith in nature's ability to provide a fruitful harvest.
   b) It highlights Lencho's lack of confidence in his crops.
   c) It reflects Lencho's belief that the flowers symbolise a bad omen.
   d) It shows Lencho's acceptance that the harvest will fail.

Extract 2

To say that for destruction ice
Is also great
And would suffice.

6. What does "suffice" mean in the context of the poem?
   a) To have no effect
   b) To be enough or adequate
   c) To be insufficient
   d) To cause an overwhelming effect

Answer the following questions:

7. What was the reaction of the postmaster when he read Lencho's letter?

_____
_____
_____
_____

8. What is the speaker’s opinion about the two ways the world can end?

_____
_____
_____
_____

9. How does the story “A Letter to God” highlight human generosity and belief in justice?

_____
_____
_____
_____
_____
_____
_____
_____
_____

10. Discuss the poet's view on the end of the world in the poem.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Section B (Grammar)

Complete the sentences below with the correct determiners:

1. ___ book on the table belongs to my brother.
2. Can you please pass me ___ pen over there?
3. We need to buy ___ apples from the market for the pie.
4. ___ dog is very friendly and loves to play with children.
5. ___ chairs are not comfortable in this room.
6. She is looking for ___ new job in the city.
7. ___ of the students in the class have already finished their homework.
8. I met ___ old friend from school at the party yesterday.
9. ___ house near the park is up for sale.
10. There is ___ milk left in the fridge. We need to buy more.

Section C (Writing)

Imagine that you live in an area with many traffic problems. Write a letter to a local authority regarding traffic problems in your area.

Points to include -

- Address the letter to the local council or traffic authority.
- Mention the traffic-related problems in your area (e.g. congestion, accidents, lack of traffic signs).
- Suggest possible solutions or improvements.
- Politely request them to take action.
- Thank them in advance for considering your request.

UNIT: 1 Answer Key

Section A (Literature)

1. b)
2. b)
3. c)
4. c)
5. a)
6. b)
7. The postmaster was initially shocked and amused when he read Lencho's letter. However, he was also moved by Lencho's faith and decided to help by collecting money from his colleagues. He even sent the money to Lencho, although it was not from God but from the post office employees.
8. The speaker believes that the world could end either through the intense passion of fire or the cold indifference of ice. He expresses a preference for fire, associating it with desire, but acknowledges that ice, representing hatred, could also lead to destruction.
9. The story highlights human generosity through the actions of the postmaster and the other employees. Despite being amused by Lencho's letter, they come together to help him in his time of need, raising money to send him. This act of kindness shows that humans, even when faced with the most extraordinary requests, can display compassion and generosity. The story also explores Lencho's belief in justice. When he receives the money, he is disappointed, believing that God's money has been tampered with by the post office employees. His belief in justice is so strong that he refuses to accept that humans might have helped him, insisting that only God could have provided the money. This reflects a blend of innocence, faith, and a certain purity in his understanding of the world.
10. In the poem "Fire and Ice", Robert Frost explores the idea of the world's destruction through the two elements of fire and ice, representing the destructive power of human emotions. The poet presents the possibility of the world ending in fire, symbolising the catastrophic consequences of intense desire and love, which can consume and destroy. Alternatively, the world could end in ice, representing hatred and coldness, which can also lead to an equally destructive and apocalyptic end. Frost uses these metaphors to suggest that both extreme emotions—passion and hatred—are capable of bringing about the world's end, offering a deep reflection on the power of human emotions and their potential for harm.

Section B (Grammar)

1. **The** book on the table belongs to my brother.
2. Can you please pass me **that** pen over there?
3. We need to buy **some** apples from the market for the pie.
4. **The** dog is very friendly and loves to play with children.
5. **These** chairs are not comfortable in this room.
6. She is looking for **a** new job in the city.
7. **Most** of the students in the class have already finished their homework.
8. I met **an** old friend from school at the party yesterday.
9. **That** house near the park is up for sale.
10. There is **some** milk left in the fridge. We need to buy more.

Section C (Writing)

Since creative writing tasks are subjective in nature, the answers will vary from student to student. Some aspects to consider while evaluating a formal letter are:

- Purpose and Clarity: ensuring there is clarity about why the letter is being written (e.g. making a request, raising a complaint, applying for something), yet remaining polite.
- Layout and Format: maintaining a standard layout and format, including sender's address, date, recipient's address, salutation, subject (optional), body of the letter, closing, and signature.
- Tone and Language: using a formal tone, being polite, using neutral language, and using active voice.
- Grammar and Punctuation: ensuring correct grammar, proper use of capitalisation, punctuation, sentence structure, and avoiding contractions.
- Avoiding Ambiguity: ensuring the purpose is clear, and avoiding unnecessary
- Professionalism: using appropriate titles (e.g. Mr., Ms., Mrs., Dr., Sir) when addressing the recipient, avoiding emotive language or jokes, and maintaining a respectful and professional tone at all times.
- Length: keeping the letter concise
- Proofreading: after writing, always proofread the letter to check for any spelling, grammar, or punctuation errors.

Learning Level Tracker

Keep a record of unit assessment results in the tracker.

As you conduct assessments based on the activities suggested, put a tick mark as per the following:

Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: English		
Roll No.	Name of the Student	Unit: 1		
		Chapters:	1. A Letter to God	
			2. Fire and Ice	
		Level 1	Level 2	Level 3

UNIT : 3
Chapters : Two Stories about Flying, The Ball Poem

Activity 1 The Importance of Flight and the Courage Behind It

35 mins

Instructions

- Divide the class into groups. Each group can be of 4-5 students.
- Print out the following passage and distribute it in groups. If you are unable to print it, you may write the passage on the board.
- Next, ask students to read the passage.

The Importance of Flight and the Courage Behind It

For centuries, humans have gazed at the sky, dreaming of soaring above the clouds. The idea of flight has captivated our imagination, symbolising freedom, exploration, and the desire to conquer the natural world. Flying, for many, represents the ultimate achievement of human ingenuity and ambition. It allows us to bridge vast distances, connect with distant cultures, and explore places that were once beyond our reach. However, the importance of flight extends beyond its practical applications; it also symbolises the courage to overcome the seemingly impossible.

In the past, humans believed that flight was a fantasy. Early myths and stories warned against the dangers of trying to fly. Yet, despite these warnings, the dream of flight persisted. As civilisation advanced, the desire to conquer the sky became a challenge that inspired scientists, inventors, and adventurers. The Wright brothers, for example, faced immense difficulties when they began their experiments in aviation. They had to confront not only technical challenges but also scepticism from the public and experts who believed human flight was a fantasy.

The courage required to attempt flight was immense. The pioneers of aviation risked their lives and reputations in the pursuit of a dream. Early flight attempts were fraught with danger, and many early aviators met with tragic ends. However, the desire to push the boundaries of human potential was stronger than the fear of failure. It was this bravery, coupled with relentless determination, that eventually led to the success of powered flight in 1903.

Flying became more than just a means of transportation; it became a symbol of human progress. The courage shown by those who dared to fly paved the way for innovations that changed the world. Today, we can travel across continents in a matter of hours, opening up opportunities for trade, communication, and cultural exchange that would have been unimaginable just a century ago. The courage to fly, to challenge the limits of human ability, ultimately changed the course of history, making the impossible a reality.

In conclusion, the dream of flight was once thought to be impossible. Yet, it was the courage of the early pioneers who believed in the power of human innovation that turned this dream into a reality. Through their bravery, we now enjoy the many benefits of flight, a testament to the strength of human determination and the unyielding quest to explore the unknown.

- Ask students to work in groups to summarise the passage in a paragraph, capturing the key points about why flight was important and the courage it took to begin flying. Each group should write the key points in a notebook.
- Afterward, each group presents their summary to the class. Discuss the similarities and differences in each group's summary to reinforce understanding and ensure key ideas are captured.

Activity 2 Subject Verb Concord

35 mins

Instructions

- Explain the concept of Subject Verb Concord through the notes below.

Teachers' Notes

Subject Verb Concord refers to the grammatical rule that the verb must agree with the subject in number (singular or plural) and person (first, second, or third person). The subject and verb must match in terms of whether the subject is singular or plural, and this is essential for constructing grammatically correct sentences.

Singular Subjects Take Singular Verbs, and Plural Subjects Take Plural Verbs

Singular Subject: Refers to one person, thing, or concept.

Plural Subject: Refers to more than one person, thing, or concept.

Examples:

Singular: The dog runs fast. (Here, "dog" is singular, so we use the singular verb "runs.")

Plural: The dogs run fast. (Here, "dogs" is plural, so we use the plural verb "run.")

Compound subjects joined by "and" take a plural verb: When two or more subjects are connected with "and," they form a plural subject, which requires a plural verb.

Examples:

Tom and Jerry are best friends. (The compound subject "Tom and Jerry" is plural, so we use the plural verb "are.")

The teacher and students are ready for class. (The compound subject "teacher and students" is plural, so we use the plural verb "are.")

Exception: If the compound subject refers to one entity or a single idea, the verb can be singular.

Fish and chips is a popular dish in Britain. (Fish and chips are treated as one dish, so the verb "is" is used.)

When subjects are joined by "or" or "nor," the verb agrees with the subject closest to It.

Examples:

Neither Tom nor his friends are going to the concert. (The plural subject "friends" is closest to the verb, so we use the plural verb "are.")

Either the teacher or the students have made a mistake. (The plural subject "students" *is closest, so we use "have."*)

Collective nouns take a singular verb when acting as a whole. Indefinite pronouns such as "everyone," "someone," "each," and "everybody" are always considered singular, so they take a singular verb.

In sentences that start with "there is" or "there are," the verb agrees with the subject that follows.

Uncountable nouns (e.g., information, advice, furniture, bread) are treated as singular, even though they might refer to multiple items in concept. Therefore, they take a singular verb.

"None" can be either singular or plural depending on whether it refers to a singular or plural noun.

"Either" and "neither" are usually followed by a singular verb when referring to a singular noun, but they can also agree with plural nouns when necessary.

"Both" and "each" take a singular verb when referring to the entire group or individual items.

- Divide the class into 4-5 groups.
- Provide each group with a different set of 10 sentences that either have Subject Verb Concord errors or are correct.
- Each group should sort the sentences into two categories: Correct and Incorrect.
- After sorting, students should correct the incorrect sentences and should explain in brief why the subject and verb do not agree in each case.
- After the activity, the groups should submit their responses to you.
- You can have each team review the other's work by reading aloud their responses. During this time, there can be a discussion on the rules for Subject Verb Concord.
- Let the class decide which team did the best!

Examples of Sentences with Correct and Incorrect Subject Verb Concord:

A. The team is practising for their big match.
B. Neither the teacher nor the students was late to the assembly.
C. The government have introduced new policies for the economy.
D. Either the teacher or the students were supposed to clean the board.
E. Everyone were excited about the weekend trip.
F. Neither of the two plans were acceptable to the committee.
G. The data are being analysed by the research team.
H. Each of the athletes was given a medal at the ceremony.
I. The books on the shelf are covered in dust.
J. None of the children has finished their homework yet.

Activity 3 Story Writing

35 mins

Instructions

- Explain to the students, basic guidelines for writing a story based on a situation. You can refer to the teacher's notes for the same.
- Divide the class into 3 groups - a, b, c.
- Write the following situations on the board.

- First Situation: One day I got wings to fly. And that led to so much adventure.
- Second Situation: When the pilot of a passenger aeroplane faced a tough situation.
- Third Situation: When a child lost his puppy.

- Provide paper to the groups for writing.
- Group "a" builds the plot and begins writing the story based on the first situation. Then the paper with the plot gets passed to group "b", which then has to complete the story.
  - Similarly, group "b" builds the plot and begins writing the story based on the second situation. Then the paper with the plot gets passed to group "c", which then has to complete the story.
  - Similarly, group "c" builds the plot and begins writing the story based on the third situation. Then the paper with the plot gets passed to group "a", which then has to complete the story.
- After the activity is completed, the stories can be read aloud. This activity will help students with the guidelines of story-writing, and at the same time bring out their creativity and individuality as well as teamwork.
- You can refer to the note for discussion as given below.

Teachers' Notes

- ***Understand the situation thoroughly***. Read and understand the situation prompt. Identify the key elements, such as setting, characters, conflict, and resolution. Think about how you can develop the story based on the situation. Consider how the situation can evolve, the challenges your character might face, and how the story can end.
- ***Structure your story***
  - Introduction (Opening): Describe the setting, time, and place. Introduce the character(s): Provide brief background information about the main character. Start the story with action or intrigue to grab the reader's attention.
  - Rising action and building the plot: Present the challenge, problem, or conflict that the character faces.
  - Climax: The turning point of the story where the character faces their biggest challenge or makes an important decision. This is the moment of highest tension or conflict.
  - Falling action: The events leading towards the resolution. The problem is being solved or lessons are learned.
  - Conclusion (Ending): The final part of the story where everything is resolved. You can offer a reflection, a lesson learned, or a feeling of closure.
- ***Develop characters and dialogue***: Introduce interesting and relatable characters. Make sure the main character has a clear goal, motivation, and conflict. Use dialogue to move the plot forward and reveal character traits.
- ***Use descriptive language and sensory details***: Describe what the character sees, hears, smells, tastes, and feels to make the story more immersive. This helps the reader connect with the story and imagine the scene.
- ***Maintain consistent point of view and tense***: Decide if the story will be told in the first person (I, we) or third person (he, she, they). Ensure the point of view is consistent throughout the story. Choose the appropriate tense (past or present) and stick with it throughout the narrative.
- ***Focus on the conflict and resolution***: A story without conflict is often dull. The conflict could be internal.
- ***Stay on topic and be relevant***: Ensure your story is directly related to the situation given.
- ***Proofread and edit***: Read through the story carefully to check for errors. Make sure your sentences are clear and well-structured. Avoid overly long sentences that may confuse the reader. Pay attention to punctuation marks like commas, periods, quotation marks, etc., especially when using dialogue.

- ***Be creative and original***: A good story often has a surprising or unique twist. Think of something unexpected that could happen in the given situation. Let your voice come through in the writing. Your creativity, personality, and style will make the story unique and enjoyable to read.

UNIT: 3 Assessment

35 mins

Section A (Literature)

Choose the correct answer from the given options:

1. What did the young seagull see when he looked down at the sea?
   a) He saw other birds flying below.
   b) He saw the water far below, which made him afraid.
   c) He saw fish swimming in the sea.
   d) He saw his family calling him.
2. The black aeroplane…
   a) confused the narrator so his aeroplane would crash.
   b) was competing with the narrator's aeroplane.
   c) helped the narrator to land safely.
   d) was just another aeroplane flying in the storm.
3. The boy lost his ball because…….
   a) it got stolen.
   b) it fell and broke.
   c) he was careless.
   d) it fell in the water.
4. What is the central theme of the poem "The Ball Poem" by John Berryman?
   a) The joy of playing with a ball
   b) The inevitability of death
   c) The emotional pain of losing something or someone
   d) The importance of material possessions

Read the following extracts and answer questions 5 and 6:

Extract 1

"…The next moment he felt his wings spread outwards. The wind rushed against his breast feathers, then under his stomach, and against his wings. He could feel the tips of his wings cutting through the air. He was not falling headlong now. He was soaring gradually downwards and outwards. He was no longer afraid. He just felt a bit dizzy. Then he flapped his wings once and he soared upwards. His parents and his brothers and sister had landed on this green flooring ahead of him. They were beckoning to him, calling shrilly…"

5. What does the phrase 'soaring gradually downwards and outwards' in this extract most nearly mean?

_____

_____

_____

Extract 2

"What is the boy now, who has lost his ball,
What, what is he to do? I saw it go
Merrily bouncing, down the street, and then
Merrily over — there it is in the water!

No use to say 'O there are other balls':
An ultimate shaking grief fixes the boy
As he stands rigid, trembling, staring down
All his young days into the harbour where
His ball went."

6. In your own words, describe the boy's reaction when he loses his ball.

_____
_____
_____

Answer the following:

7. What was the importance of hunger in the young seagull's decision to fly?

_____
_____
_____
_____
_____

8. What role did the bird's family play in his journey?

_____
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9. What lesson about life and loss does the boy learn in "The Ball Poem"?

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Section B (Grammar)

Fill in the blanks using the correct Subject Verb Concord.

1. The dog _____ (run) in the park every morning.
2. Neither the teacher nor the students _____ (know) the answer.
3. The children _____ (play) in the garden right now.
4. She _____ (be) very excited about the upcoming holiday.
5. Each of the books _____ (have) a different cover design.
6. The team _____ (win) the match yesterday.
7. There _____ (be) a lot of traffic on the road today.
8. My father and I _____ (go) to the cinema later.
9. The news _____ (be) very surprising yesterday.
10. Neither the cat nor the dog _____ (want) to go outside.

Section C (Writing)

Write a story based on the following situation:

A kitten named Luna is afraid of bigger animals. Her cat family helps her, and finally, Luna is not fearful anymore.

Clues for the story:

- Shadow, a bigger cat is scary.
- Noises from the neighbour's dog.
- Mother and sister introducing Luna to Shadow - Shadow is not scary.
- Feeling braver

UNIT: 3 Answer Key

Section A (Literature)

1. d)
2. c)
3. d)
4. c)
5. The phrase "soaring gradually downwards and outwards" typically refers to a smooth gliding movement to go down slowly, while also spreading or expanding.
6. The boy is filled with deep sorrow when he loses his ball. He is in shock and cannot move. His body is shaking due to the loss.
7. Hunger was very important in the young seagull's decision to fly. He was initially afraid to fly, but when his mother held a piece of fish in front of him, tempting him with food, his hunger drove him to overcome his fear. Unable to resist the urge to eat, he finally spread his wings and took flight, realising that flying was the only way to reach the food.
8. The bird's family played a very important role in helping him gain confidence during his first flight. Once the bird began flying, his mother swooped past him, her wings making a loud noise. Then his father flew over him. He saw his two brothers and his sister flying around him curvetting and banking and soaring and diving. Their presence helped him trust himself and keep going even though he was still afraid. Then his parents and siblings had already landed on a green ground ahead of him. They were calling out to him, waving, and encouraging him to come over. This made the bird feel less scared and more supported, as he knew they were watching and cheering for him.
9. In "The Ball Poem," the boy learns the painful but important lesson of loss. His ball, which he was playing with joyfully, ends up in the water, and he is unable to retrieve it. The poet emphasises that the boy cannot replace the ball easily because it holds more meaning than just a simple object. Through this experience, the boy learns about responsibility and the inevitable losses that come in life. The loss teaches him how to cope with difficult emotions and accept the idea that possessions, once lost, can never truly be replaced. This understanding is part of growing up.

Section B (Grammar)

1. The dog **runs** in the park every morning.
2. Neither the teacher nor the students **know** the answer.
3. The children **are playing** in the garden right now.
4. She **is** very excited about the upcoming holiday.
5. Each of the books **has** a different cover design.
6. The team **won** the match yesterday.
7. There **is** a lot of traffic on the road today.
8. My father and I **are going** to the cinema later.
9. The news **was** very surprising yesterday.
10. Neither the cat nor the dog **wants** to go outside.

Section C (Writing)

Since creative writing tasks are subjective, the answers will vary from student to student. Some aspects to consider while evaluating a story - based on a situation are:

- The plot is the sequence of events that make up the story. It includes an introduction, rising action, climax, falling action, and conclusion.
- Characters are the people or beings that drive the story forward.
- The setting is where and when the story takes place.
- The conflict is the central problem or challenge the characters face.
- The theme is the central idea or message the story conveys.
- The point of view is the perspective from which the story is told.
- Dialogue is the conversation between characters.
- Style and Language - the way the story is written affects its tone and impact.
- Pacing refers to how quickly or slowly the events unfold in the story.
- Often, stories have a deeper moral or lesson for the reader.

Learning Level Tracker

Keep a record of unit assessment results in the tracker.

As you conduct assessments based on the activities suggested, put a tick mark as per the following:

Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: English		
Roll No.	Name of the Student	Unit: 3		
		Chapters:	1. Two Stories about Flying	
			2. The Ball Poem	
		Level 1	Level 2	Level 3

UNIT : 4

Chapters : From the Diary of Anne Frank, Amanda!

Activity 1 Air Pollution in Delhi (July to December 2024)

35 mins

Instructions

- Divide the class into 3 groups.
- Print out the following passage and distribute it in groups. If you are unable to print it, you may write the passage on the board.
- Next, ask students to read the passage.

Air Pollution in Delhi (July to December 2024)

Air pollution in Delhi continues to be a serious concern, particularly during the colder months when the air quality deteriorates significantly. In cities like Delhi, poor air quality often leads to severe health problems such as respiratory diseases, cardiovascular issues, and premature deaths. According to the World Health Organization (WHO), air pollution is responsible for over 7 million deaths annually, with India being a major contributor to this figure.

The Air Quality Index (AQI) is a scale that measures air pollution. An AQI between 0-50 is considered "Good", while an AQI above 300 is classified as "Hazardous" and poses a serious health risk to the general population. The following table presents the AQI levels in Delhi from July to December 2024.

Air Quality Index (AQI) in Delhi (July to December 2024)

Month	Average AQI	Air Quality Classification	Major Contributing Factors
July	160	Unhealthy	Vehicular emissions, dust storms
August	180	Unhealthy	Vehicular emissions, industrial emissions
September	150	Unhealthy	High traffic, low rainfall, dust
October	135	Unhealthy	Increased vehicular traffic, construction dust
November	250	Very Unhealthy	Crop residue burning, low wind speeds
December	350	Hazardous	Smog formation, crop residue burning, cold weather

The Indian government has implemented several measures to curb air pollution, including:

The Odd-Even Scheme*: To reduce vehicular emissions, Delhi has implemented the Odd-Even Scheme, which restricts cars based on their number plates on alternate days.*

***Promotion of Electric Vehicles (EVs)**: The government is encouraging the adoption of electric vehicles by offering financial incentives and building more charging infrastructure.*

***Smog Towers**: Delhi has installed several smog towers to filter the polluted air in heavily affected areas, particularly during the winter months.*

***Ban on Crop Residue Burning**: The government has imposed a ban on crop residue burning and introduced alternatives for farmers, such as providing machines for stubble management.*

Despite these efforts, air pollution remains a significant challenge in Delhi, and further steps are needed to improve the city's air quality. Long-term solutions include increasing green spaces, improving public transportation, and enforcing stricter emission standards.

- Each group of students will represent one of the following:
  - *The Government*: Justifies policies and actions such as the Odd-Even scheme, Smog Towers, and subsidies for electric vehicles.
  - ***Environmental Activists***: Argue for more immediate action and stricter regulations on industrial emissions and crop residue burning.
  - ***Local Citizens***: Express concerns about how air pollution impacts their daily lives and discuss the challenges of using public transport or electric vehicles.
- Each group will discuss and prepare their points after which, they will present the same in class.
- Conclude the role-play with a class discussion: What measures seem most feasible in the short and long term?

Activity 2 Modals

35 mins

Instructions

- Explain the concept of Modals through the notes below.

Teachers' Notes

Modals are auxiliary verbs that express necessity, possibility, permission, ability, or obligation. They help to add meaning to the main verb of a sentence by showing how the action is viewed by the speaker, such as whether it is certain, possible, allowed, or required.

Common Modals:

- **Can** – ability or permission
  She can swim. (ability)
  You can leave early today. (permission)
- **Could** – past ability, polite requests, or possibility
  When I was younger, I **could** *run very fast*. (past ability)
  ***Could** you help me with this?* (polite request)
  It ***could** rain tomorrow.* (possibility)
- **May** – permission or possibility
  ***May** I use your phone?* (permission)

*It **may** snow this evening.* (possibility)

- **Might** – slight possibility or suggestion
  *She **might** come to the party*. (slight possibility)
  *You **might** want to reconsider that decision.* (suggestion)
- **Shall** – formal suggestion, offer, or future action (often used with "I" and "we")
  ***Shall** we go for a walk?* (suggestion)
  *I **shall** finish the work tomorrow.* (future action)
- **Should** – advice, recommendation, or expectation
  *You **should** eat more vegetables.* (advice)
  *He **should** be here by now.* (expectation)
- **Will** – future action, willingness, or strong likelihood
  *I **will** call you later.* (future action)
  *She **will** help us.* (willingness)
- **Would** – polite requests, hypothetical situations, or past habitual actions
  Would you like some tea? (polite request)
  If I were you, I would study more. (hypothetical situation)
- **Must** – necessity, obligation, or strong recommendation
  *You **must** wear a helmet when riding a bike.* (obligation)
  *This **must** be the right address.* (strong likelihood)
- **Ought to** – advice or moral obligation
  You **ought** to apologise for being late. (advice)

Important Points to Remember:

- **Modals do not change form** according to the subject *(e.g., She can, They can)*.
- **They are followed by the base form** of the main verb *(e.g., She can swim)*.
- **Modals express degrees of certainty**: *can (high certainty)*, may (less certain), *might* (least certain).

- Divide the class into groups of 4-5 students each.
- Provide a few scenarios to each group on paper (either printed or hand-written).
- Each group will enact the scenarios given to them. While one student will act out the role, the other will respond according to the scenario.
- The scenario will be read, and it will be decided which modal verbs are appropriate for the situation.
- Students will role-play the scenario using the correct modals, and make sure to express the intended meaning clearly and naturally.
- You can share a role-play example based on a scenario:

<u>*Example:*</u> *You are a teacher and need to tell your students that they must finish their homework*. Possible Modals to Use: *must, should, can*

<u>Example Dialogue:</u>

Teacher: “You must finish your homework by tomorrow.”

Student: “What if I can’t finish it in time?”

Teacher: “You should start now to avoid any problems. If you need help, you can ask me.”

<u>*Explanation:*</u> **“Must”** is used to indicate an obligation or necessity. **“Should”** is used here as a suggestion to help the student manage their time. **“Can”** is used to offer assistance or give permission to ask for help.

Scenarios:

- You are at a restaurant and want to politely ask for a glass of water.
- You are a friend offering help with a difficult task.
- You are suggesting a study method to your classmate for their upcoming exam.
- You need to ask your boss for permission to leave early.
- You are at the doctor's office and need to ask for an appointment.
- You are on the phone with a customer service representative, and you want to inquire about a product.
- You are asking your friend if they would like to join you for a movie night.
- You are writing an email to your teacher to ask for an extension on a homework deadline.
- You need to ask your colleague if they have time to help with a project.
- You are at the bank and need to ask about opening a new account.
- You want to ask if it's possible to borrow a friend's notes.
- You want to suggest to a friend that they should take a break.
- You want to ask your parents if you can go out with friends.
- You want to give advice to a friend who's feeling stressed.
- You are in a meeting and want to ask if you can provide input.
- You are at the airport, and you want to ask if you can board the flight earlier.
- You are advising a friend on their career choice.
- You are advising a friend who wants to improve their grades.
- You are asking your teacher if you may leave the classroom for a moment.
- You want to suggest to your friends that they might want to bring a jacket, as it could get cold.

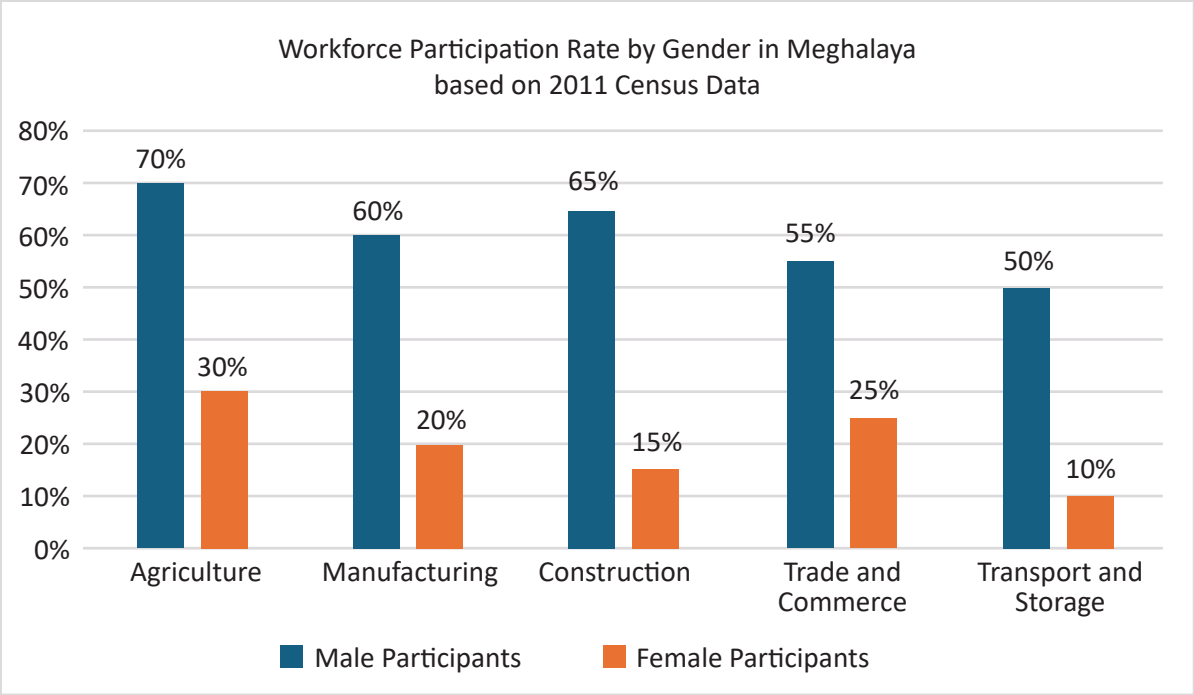
- Share your feedback on the role plays focusing on the use of 'modals'.
- After students perform their role-play, ask them to explain why they chose certain modals in specific situations. Encourage students to be mindful of the context and tone when using modals.

Activity 3 Analytical Paragraph Writing

35 mins

Instructions

- Explain the concept of writing an analytical paragraph on a given map/chart/graph/cue etc.
- You can refer to the notes given below.
- Divide the class into 4-5 groups.
- Provide printouts of the following information to each group or draw it on the board.
- Ask groups to go through the information in the figure.



- Each group should write an analytical paragraph to describe the information on the participation of the women workforce in Meghalaya as per the data given.
- Once the group completes writing paragraphs they will share it with the class.
- Share your feedback with the groups.

Teachers' Notes

An **analytical paragraph** is a type of writing where you examine and interpret data, facts, or information presented in a given graph, chart, table, map, or other types of cues. The purpose of an analytical paragraph is to break down the given data, explain its meaning, identify patterns, and offer insights or conclusions based on that data. When writing an analytical paragraph based on data, you need to not only present the facts but also interpret them, showing how they relate to each other and what they signify.

Guidelines for writing an analytical paragraph:

- **Understand the data**: Before writing, carefully study the data or cue (such as a graph, chart, or map) provided. Look at the labels, figures, and trends.

- Identify key patterns, trends, or comparisons in the data.
- **Introduction to the data**: Start your paragraph by briefly describing the data or cue you're analysing. Mention what kind of data it is, and provide a brief overview. For example: "The bar graph shows the population distribution in different regions of the country."
- **Presenting the key data**: Focus on the most important points from the data. You don't need to cover everything, just highlight significant trends or comparisons. Compare data points where relevant. For example, you could compare two categories or look at how numbers change over time.
- **Interpretation**: After stating the data, analyse what it means. Discuss any patterns, trends, or anomalies. For example, if a chart shows an increase in a particular activity, you can explain why this might have happened based on the context (such as seasonal changes, economic factors, etc.). Discuss the relationships between different data points. For example: "While the male workforce participation rate is higher, female participation is notably lower, especially in rural areas."
- **Provide insights and conclusion**: Summarise the key takeaways from the data and what they imply. Offer any conclusions or implications of the data. For example, you might explain how the data suggests the need for policy changes, further research, or increased awareness.
- **Use formal language and objectivity**: Since this is an analytical task, maintain a formal tone. Avoid using subjective opinions or emotional language. Stick to objective analysis of the data presented, based on facts.
- **Avoid Repetition**: Avoid repeating the same information. Each sentence should add new value to your analysis.

Structure of an Analytical Paragraph

- **Introduction Sentence**: Introduce the data or cue. Briefly state what the data shows.
- **Body**: Present and compare the key points or trends in the data. Interpret what the data reveals, looking for patterns or important insights.
- **Conclusion**: Offer a summary or conclusion based on the data analysis. Discuss the implications or any conclusions that can be drawn from the data.

UNIT: 4 Assessment

35 mins

Section A (Literature)

Choose the correct answer from the given options:

1. Why did Anne start writing a diary?
   a) She wanted to be a famous writer.
   b) She felt lonely and needed a friend.
   c) Her teacher asked her to write a diary.
   d) She wanted to improve her handwriting
2. Why was the Maths teacher, Mr. Keesing annoyed with Anne at first?
   a) She used to write her diary in school.
   b) She fought with her classmates.
   c) She did not attend his class.
   d) She used to talk a lot.
3. Why does the speaker constantly scold Amanda in the poem?
   a) She is always late
   b) She is distracted and not listening
   c) She is too quiet
   d) She doesn't do her homework
4. What does Amanda dream of doing?
   a) Going to school
   b) Riding a horse
   c) Swimming in the sea
   d) Playing with her friends

Read the following extracts and answer questions 5 and 6.

Extract 1

"Paper has more patience than people.' I thought of this saying on one of those days when I was feeling a little depressed and was sitting at home with my chin in my hands, bored and listless, wondering whether to stay in or go out. I finally stayed where I was, brooding: Yes, the paper does have more patience, and since I'm not planning to let anyone else read this stiff-backed notebook grandly referred to as a 'diary' unless I should ever find a real friend, it probably won't make a bit of difference. Now I'm back to the point that prompted me to keep a diary in the first place: I don't have a friend."

5. What does Anne mean by "Paper has more patience than people"?

_____
_____
_____
_____

Extract 2

"(I am an orphan, roaming the street.
I pattern soft dust with my hushed, bare feet.)"

6. What does the phrase ‘roaming the street’ suggest?

_____

Answer the following:

7. "Mr Keesing had a good sense of humour and was open to change." How does this statement reflect his character?

_____
_____
_____
_____

8. What do Amanda’s imaginary worlds tell us about her personality?

_____
_____
_____
_____

9. What does Anne’s diary tell us about her personality and her view of life?

_____
_____
_____
_____
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_____

10. How does the poem, Amanda! reflect the theme of childhood and parental control?

_____
_____
_____
_____
_____
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_____
_____
_____

Section B (Grammar)

Fill in the blanks with the correct modal verb.

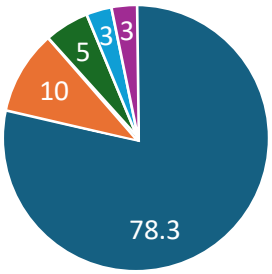
1. You _____ bring your homework tomorrow, or you'll have to do it in class.
2. We _____ go to the cinema if we finish our work early.
3. You _____ eat more vegetables to stay healthy.
4. He _____ have forgotten about the meeting; he's not here yet.
5. They _____ come to the party, but they haven't decided yet.
6. She _____ speak three languages fluently.
7. We _____ leave now if we want to catch the last bus.
8. You _____ be more careful with your phone; it might break.
9. We _____ visit the museum when we're in town next week.
10. I _____ find my keys anywhere! I must have left them at home.

Section C (Writing)

Write an analytical paragraph summarising the data provided in the figures. Discuss the diversity as well as integration related to languages in Meghalaya.

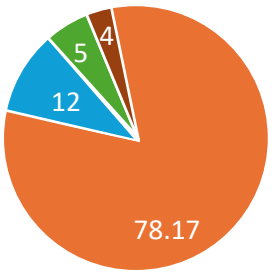
Note: The numbers signify the percentage of people speaking the language.

Languages Spoken in Khasi Hills



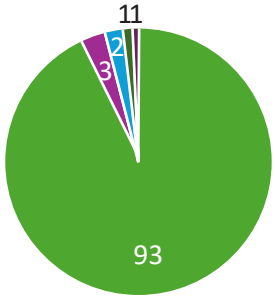
Khasi Garo English Hind Bengali

Languages Spoken in Jaintia Hills



Pnar Khasi English Hind

Languages Spoken in Garo Hills



Garo Khasi English Hind Assanese

Data Source: Census of India 2011 (Wikipedia)

UNIT: 4 Answer Key

Section A (Literature)

1. b)
2. d)
3. b)
4. c)
5. Writing is a way to express emotions freely.
6. The phrase 'roaming the street' suggests that Amanda wants to be free without restrictions.
7. At first, Mr Keesing was strict and often punished Anne for talking too much. However, after reading Anne's humorous essay, he laughed and stopped punishing her. This shows that he could accept different perspectives, appreciate humour, and change his approach as a teacher.
8. Amanda is creative and seeks freedom. She dreams of being a mermaid, an orphan, and Rapunzel, all representing independence and a peaceful life away from restrictions.
9. Anne's diary shows that she was smart, kind, and curious. She liked to observe people and situations. Even when she faced problems, she stayed hopeful. Writing helped her feel better and express her emotions. She had a deep understanding of life and people. She tried to stay happy even in hard times. Her diary helps us understand her thoughts and feelings. It also shows her courage and strength. Despite her young age, she was mature and thoughtful. Her diary is not only a personal story but also a record of history. It teaches us about the power of hope and writing.
10. The poem Amanda! reflects the theme of childhood and parental control by highlighting the tension between a child's desire for freedom and a parent's attempt to impose rules for their well-being. Amanda, like many children, longs for independence and space to express herself without being constantly told what to do. Her mother's frequent instructions, such as sitting up straight or speaking properly, contrast sharply with Amanda's daydreams of freedom, where she imagines herself as a carefree child or swimming in the sea. These fantasies reveal her longing to escape the restrictions of parental control. At the end of the poem, Amanda's silence signifies her frustration and the emotional impact of excessive control, suggesting that too many rules can suppress a child's happiness and sense of self. Through Amanda's experience, the poet explores the delicate balance between guiding children for their own good and allowing them the freedom to develop their own individuality.

Section B (Grammar)

1. You **must** bring your homework tomorrow, or you'll have to do it in class.
2. We **might** go to the cinema if we finish our work early.
3. You **should** eat more vegetables to stay healthy.
4. He **must** have forgotten about the meeting; he's not here yet.
5. They **might** come to the party, but they haven't decided yet.
6. She **can** speak three languages fluently.
7. We **should** leave now if we want to catch the last bus.
8. You **should** be more careful with your phone; it might break.
9. We **will** visit the museum when we're in town next week.
10. I **can't** find my keys anywhere! I must have left them at home.

Section C (Writing)

Since creative writing tasks are subjective in nature, the answers will vary from student to student. Some aspects to consider while evaluating an analytical paragraph are:

- Does the paragraph start with a clear and focused topic sentence?
- Does the paragraph go beyond summary and show critical thinking?
- Does the paragraph stay focused on one main idea?
- Are linking words or phrases used effectively to connect ideas (e.g., furthermore, in contrast, this shows that)?
- Is there a variety of sentence structures and vocabulary?
- Does the paragraph end with a sentence that summarizes or reinforces the main point?
- Does it offer a concluding thought or insight based on the analysis?

Learning Level Tracker

Keep a record of unit assessment results in the tracker.

As you conduct assessments based on the activities suggested, put a tick mark as per the following:

Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: English		
Roll No.	Name of the Student	Unit: 3		
		Chapter:	1. From the Diary of Anne Frank	
			2. Amanda!	
		Level 1	Level 2	Level 3

UNIT : 5
Chapters: Glimpses of India, The Trees

Activity 1 Colours of Indian Culture

35 mins

Instructions

- Provide students with printouts of the passage below or you can write it on the board.
- Next, ask students to read the passage.

Colours of Indian Culture

Rajasthan – Land of Forts and Faith

Rajasthan, known for its grand *forts and royal palaces, reflects the glory of India's historic past. Cities like Jaipur and Udaipur are admired for their architectural wonders such as the Amber Fort and the City Palace. The State is also known for its folk music and dance, including the lively "Ghoomar". Local crafts like blue pottery, leatherwork, and tie-dye textiles are cherished by both locals and visitors. Rajasthan celebrates festivals from all faiths. While Diwali lights up homes and palaces, Eid is joyfully observed with community prayers and feasting. Historic towns like Ajmer are home to religious landmarks such as the Ajmer Sharif Dargah, a symbol of spiritual unity.*

Meghalaya – The Hill State of Harmony

Nestled in North-East India, Meghalaya is known for its lush green hills, cascading waterfalls, and misty valleys. The State is home to vibrant tribal communities like the Khasis, Garos, and Jaintias, who maintain a strong connection to Nature and their ancestral traditions. Bamboo and cane crafts are an essential part of life here, used to make everything from furniture to musical instruments. While many in Meghalaya follow Christianity, the state also respects indigenous beliefs. Churches are beautifully decorated during Christmas, and harvest festivals like "Nongkrem" dance are celebrated with prayer, dance, and thanksgiving to nature.

Tamil Nadu – A Tapestry of Tradition

In the Southern part of India, Tamil Nadu is a land of ancient monuments, classical art, and spiritual heritage. The Meenakshi temple in Madurai and the Brihadeeswarar temple in Thanjavur are known for their grand "gopurams" (temple towers) and exquisite stone carvings.
The State is also the heart of "Bharatanatyam", one of India's oldest classical dance forms. Tamil Nadu's famous Kanchipuram silk sarees and bronze sculptures reflect the region's love for fine craftsmanship. The people of Tamil Nadu celebrate a range of festivals. Pongal, a harvest festival, is marked by colourful kolams (rice flour designs), traditional cooking, and offerings to the Sun God.

India's strength lies in its diversity — where every region contributes something special to the nation's shared identity. From the deserts to the hills and the coasts, this journey through Rajasthan, Meghalaya, and Tamil Nadu is just a small glimpse into the larger story of unity in diversity.

- You can address any difficult words or concepts students might need clarity on. You can refer to the notes below for the same.

Teacher's Notes
(Words and Concepts)

Forts are strong buildings built for defence, often by kings or rulers in the past.
Palaces are large, beautiful homes where royal families lived.
Folk music and dance are traditional forms of music and dance that are passed down through generations in a region.
Blue pottery is a famous Rajasthani craft using a shiny blue glaze to make decorative pottery.
Leatherwork refers to hand-made items created using leather, like shoes and bags.
Tie-dye textiles are fabrics made by tying and dyeing sections to create colourful patterns.
Spiritual unity means harmony and respect among people of different religions.
Tribal communities are groups of people who follow ancient customs and often live close to nature.
Indigenous beliefs are original spiritual or religious practices followed by native people of an area.
Bamboo and cane crafts are items like baskets or mats made using bamboo or cane by hand.
Harvest festival is a celebration held when crops are gathered, to thank nature or the gods.
Gopuram is a tall, richly decorated tower at the entrance of a South Indian temple.
Bharatanatyam is one of India's oldest classical dance forms, known for graceful movements and expressions.
Kanchipuram silk sarees are traditional silk garments woven in the town of Kanchipuram, known for their quality and elegance.
Bronze sculptures are statues made of bronze, often showing gods or cultural stories.
Kolam is a decorative pattern made using rice flour, drawn on the ground during festivals.
Diversity means having many different cultures, languages, or traditions in one place.
Unity in diversity is the idea of people living peacefully together, despite their different backgrounds.

- Explain to the class, the concept of a brochure, specifically a travel brochure. You may use the following notes for definitions and a sample travel brochure for the students' understanding.

Teacher's Notes – Travel Brochure

- A **brochure** is a small booklet or leaflet that gives information about a place, product, event, or service. It is often used to advertise or promote something. Brochures usually include: pictures or drawings; catchy headlines or slogans; short and clear sentences; useful details about the place/ product/ event/ service; contact information etc.
- A **travel brochure** is a type of booklet or leaflet that gives information about a travel destination. It is designed to attract tourists by highlighting the best features of a place. A travel brochure usually includes: a catchy slogan or title; pictures of famous landmarks or natural beauty; details about places to visit, things to do, and local culture; information on festivals, food, transport, and accommodation; clear and attractive layout with bullet points or short paragraphs. Travel brochures are often used by tourism departments or travel agencies to encourage people to visit a city, state, or country.

Sample Travel Brochure

MADHYA PRADESH – "The Heart of Incredible India!"
Discover heritage, wildlife, art, and mouth-watering flavours all in one State.

Must-Visit Destinations:
- Khajuraho Temples – UNESCO World Heritage Site known for stunning ancient carvings.
- Kanha & Bandhavgarh National Parks – Spot the majestic Bengal tiger!
- Sanchi Stupa – A sacred Buddhist site with 2,000-year-old stupas.
- Gwalior Fort – A hilltop fortress with a grand history.
- Bhimbetka Rock Shelters – Prehistoric cave paintings over 30,000 years old.

Famous Festivals:

- Lokrang Festival (Bhopal) – Celebrates folk culture with music, dance & crafts.
- Khajuraho Dance Festival – Classical dance performances near ancient temples.
- Diwali & Dussehra – Celebrated with great enthusiasm and colourful lights.

Flavours to Savour:

- Poha-Jalebi – The State's iconic breakfast combo!
- Dal Bafla – Traditional dish similar to Dal Baati, served with ghee.
- Rogan Josh & Seekh Kebabs – Popular in regions like Bhopal.

Traditional Crafts:

- Chanderi & Maheshwari Sarees – Known for delicate silk and cotton weaves.
- Dokra Art – Ancient metal casting using the lost-wax method.
- Terracotta & Tribal Paintings – Express the stories of the Gond and Bhil tribes.

Why Visit Madhya Pradesh?

Perfect for history lovers, wildlife explorers, and culture seekers.
Warm-hearted locals and rich traditions.
A blend of modernity and ancient charm.

Don't Forget Your Camera!

Whether it's spotting tigers, admiring temple carvings, or enjoying street food – Madhya Pradesh offers picture-perfect moments at every turn.

Plan Your Adventure Today!

Visit: State website

- Divide the class into 3 groups, each representing a State from the passage.
- Provide the groups with some materials, if available: chart paper, colour pens, watercolours, and brushes. Otherwise, the groups can use their notebooks for the activity.
- Ask the groups to d**esign a Travel Brochure based on the State they are representing. The brochure can include:**
  - A catchy slogan for the State
  - Places to visit
  - Any famous festivals and/or food
  - Traditional craft(s)
  - Creative elements, such as images or drawings, bullet points, and concise *sentences.*
- The groups can have a short presentation of their Travel Brochures.

Activity 2 Determiners

35 mins

Instructions

- Begin the class with a revision on Determiners that are covered in the previous class.
- Next, explain the remaining 3 types of Determiners - Numbers, Distributive, and Interrogative. You can refer to the notes below.

Teacher's Notes

Determiners - "Words used before a noun to specify it."
Their function and example. - "This bag" specifies a particular bag. "Some flowers" indicate an unspecified number.

Introduce the following determiners:
Numbers (one, two, first, second, etc.): Numbers provide specific information about quantity or order. *Examples:* "One of the primary reasons for the failure of the plan was poor communication among the team members." "She was the second person in her family to graduate with honours from a prestigious university."
Distributive (each, every, either, neither): Distributives focus on individuals within a group or on a choice between items. *Examples: "Each participant was given a certificate of appreciation at the end of the workshop." "Neither of the proposed solutions was effective in addressing the underlying issue."*
Interrogative (what, which, whose): Interrogative determiners are used to form questions. *Examples:* "What specific measures can we take to reduce pollution in our city and its surrounding areas?" "Which of these novels do you think would be most suitable for the upcoming book review competition?"

- Divide the class into 5 groups.
- Provide each group with 5 Determiners and ask them to choose the correct determiners for the sentences given.
- Ask them to make 5 sentences with the given determiners.
- Each group needs to identify the types of determiners and write them.

Group 1
Determiners: Each, What, One, Neither, Whose

1. _____ slice of cake is enough. (Determiner type: _____)
   New Sentence: _____
2. _____ pencil is on the floor? (Determiner type: _____)
   New Sentence: _____
3. _____ time is the lesson? (Determine type: _____)
   New Sentence: _____
4. _____ answer is correct. (Determiner type: _____)
   New Sentence: _____
5. _____ student has a textbook. (Determiner type: _____)
   New Sentence: _____

Group 2
Determiners: Two, Which, Every, What, Neither

1. _____book are you reading? (Determiner type: _____)

New Sentence: _____

2. _____of us are going to the museum. (Determiner type: _____)
   New Sentence: _____
3. _____of them wanted to apologise. (Determiner type: _____)
   New Sentence: _____
4. _____shoes are yours? (Determiner type: _____)
   New Sentence: _____
5. _____morning I drink tea. (Determiner type: _____)
   New Sentence: _____

Group 3

Determiners: Three, What, Either, Whose, Every

1. _____boys were late for school. (Determiner type: _____)
   New Sentence: _____
2. _____student must wear uniform. (Determiner type: _____)
   New Sentence: _____
3. _____reason did he give for being late? (Determiner type: _____)
   New Sentence: _____
4. _____turn is it to clean the board? (Determiner type: _____)
   New Sentence: _____
5. _____route will take you to the station. (Determiner type: _____)
   New Sentence: _____

Group 4

Determiners: Four, Each, Which, One, Two

1. _____students were given detention. (Determiner type: _____)
   New Sentence: _____
2. _____route do you prefer? (Determiner type: _____)
   New Sentence: _____
3. _____of the lights isn't working. (Determiner type: _____)
   New Sentence: _____
4. _____chairs are missing from the hall. (Determiner type: _____)
   New Sentence: _____
5. _____of the puppies has a name. (Determiner type: _____)
   New Sentence: _____

Group 5

Determiners: Neither, What, One, Whose, Each

6. _____student has a textbook. (Determiner type: _____)
   New Sentence: _____
7. _____slice of cake is enough. (Determiner type: _____)
   New Sentence: _____
8. _____time is the lesson. (Determiner type: _____)
   New Sentence: _____
9. _____pencil is on the floor. (Determiner type: _____)
   New Sentence: _____
10. _____answer is correct. (Determiner type: _____)
    New Sentence: _____

- After the activity, each group can present their work.
- While one group presents, the other groups can share their feedback.
- Correct the sentences if required.

Activity 3 Analytical Paragraph Writing

35 mins

Instructions

- Revise the concept of writing an analytical paragraph on a given map/chart/graph/cue etc. with the class.
- You can refer to the notes given below.

Teacher's Notes

An **analytical paragraph** is a type of writing where you examine and interpret data, facts, or information presented in a given graph, chart, table, map, or other types of cues. The purpose of an analytical paragraph is to break down the given data, explain its meaning, identify patterns, and offer insights or conclusions based on that data.

Guidelines for writing an analytical paragraph:

- **Understand the data:** Study the data or cue (such as a graph, chart, or map) provided. Identify key patterns, trends, or comparisons in the data.
- **Introduction to the data:** Start your paragraph by briefly describing the data or cue you're analysing. Mention what kind of data it is, and provide a brief overview.
- **Presenting the key data:** Focus on the most important points from the data. You don't need to cover everything, just highlight significant trends or comparisons. Compare data points where relevant.
- **Interpretation:** After stating the data, analyse what it means. Discuss any patterns, trends, or anomalies.
- **Provide insights and conclusion:** Summarise the key takeaways from the data and what they imply. Offer any conclusions or implications of the data.
- **Use formal language and objectivity:** Stick to objective analysis of the data presented, based on facts.
- **Avoid Repetition:** Avoid repeating the same information. Each sentence should add new value to your analysis.

Structure of an Analytical Paragraph

- **Introduction Sentence:** Introduce the data or cue. Briefly state what the data shows.
- **Body:** Present and compare the key points or trends in the data. Interpret what the data reveals, looking for patterns or important insights.
- **Conclusion:** Offer a summary or conclusion based on the data analysis. Discuss the implications or any conclusions that can be drawn from the data.

- Divide the class into 4-5 groups.
- Provide printouts of the following table to each group or draw the table on the board.

State	Literacy Rate (%)	Male Literacy (%)	Female Literacy (%)
Kerala	94.0	96.1	92.1
Bihar	61.8	71.2	51.5
Maharashtra	82.3	89.8	74.8
Rajasthan	66.1	79.2	52.1
Tamil Nadu	80.1	86.8	73.4

(Data source: Based on Government and Census estimates – simplified for classroom use)

- Ask groups to study the table and discuss it.
- After the discussion ask them to write an analytical paragraph based on the data given.
- Ask them to refer to the following points:
  - General observation about literacy across the five States.
  - Highlighting the State with the best performance and the one with the lowest.
  - Comments on the gender disparities observed and suggesting possible reasons for these trends.
  - Summarise findings.

UNIT: 5 Assessment

35 mins

Section A (Literature)

Choose the correct answer from the given options:

1. What is Coorg compared to in terms of its natural beauty?
   a) a land of snow-capped mountains
   b) a piece of heaven that must have drifted from the kingdom of God
   c) a desert oasis in the south
   d) a mirror of the British countryside

2. According to the chapter, what is the most distinct cultural feature of the people of Coorg?
   a) their martial traditions and bravery
   b) their love for music and dance
   c) their farming techniques
   d) their colourful tribal festivals

3. In the line "no sun bury its feet in shadow," what does the phrase "bury its feet in shadow" mean?
   a) The Sun is completely hidden behind thick clouds.
   b) The sunlight cannot pass through the trees to make shadows.
   c) The Sun is slowly setting behind tall mountains.
   d) The Sun is shining brightly without any hindrance.

4. What is the speaker's attitude towards the movement of trees?
   a) indifferent and unconcerned
   b) sad and regretful
   c) hopeful and positive
   d) controlling and restrictive

Read the following extracts and answer questions 5 and 6:

Extract 1

"During our childhood in Goa, the baker used to be our friend, companion and guide. He used to come at least twice a day. Once, when he set out in the morning on his selling round, and then again, when he returned after emptying his huge basket. The jingling thud of his bamboo woke us up from sleep and we ran to meet and greet him. Why was it so? Was it for the love of the loaf? Not at all. The loaves were bought by some Paskine or Bastine, the maid-servant of the house! What we longed for were those bread-bangles which we chose carefully. Sometimes it was sweet bread of special make."

5. State whether the following statement is True or False. Justify with a proper reason.
The children wanted to buy loaves of bread from the baker.

_____
_____
_____

Extract 2
"The trees are moving out into the forest,
the forest that was empty all these nights."

6. What does the movement of trees symbolise in the poem?

_____
_____

Answer the following:

7. Why does the writer describe the tea gardens as a "magnificent view"?

_____
_____
_____
_____

8. In the poem 'The Trees',ow does the poet create an atmosphere of silence and tension in the poem?

_____
_____
_____

9. Compare and contrast the life of a baker in Goa with that of a tea plucker in Assam.

_____
_____
_____
_____

Section B (Grammar)

Fill in the blanks with an appropriate Determiner from the list below. Also, mention the type of Determiner in the sentence.

Determiner List: one, two, three, each, every, either, neither, what, which, whose)

1. _____ student in the class must submit the project by Friday. (Determiner type: _____)
2. _____ of the books do you prefer — fiction or biography? (Determiner type: _____)
3. I have invited _____ friends to my birthday party. (Determiner type: _____)
4. _____ pen is this on the table? (Determiner type: _____)
5. _____ parent was asked to attend the meeting. (Determiner type: _____)
6. Only _____ of the options was correct. (Determiner type: _____)
7. He read _____ of the novels in the series. (Determiner type: _____)
8. _____ shirt are you going to wear for the function? (Determiner type: _____)
9. _____ of the twins is taller than the other. (Determiner type: _____)
10. She has planted _____ rose bushes in her garden. (Determiner type: _____)

Section C (Writing)

Write an analytical paragraph summarising the data provided in the table.

Forest Cover Loss in Selected Indian States (2017–2021)

State	Forest Loss (2017–2019)	Forest Loss (2019–2021)	Change in Loss	Main Reasons for Loss
Arunachal Pradesh	230 sq. km	257 sq. km	+27 sq. km	Shifting farming, road construction, and encroachment
Manipur	219 sq. km	249 sq. km	+30 sq. km	Illegal logging, farming, and land clearing
Mizoram	198 sq. km	186 sq. km	–12 sq. km	Jhum farming, tree cutting
Nagaland	210 sq. km	235 sq. km	+25 sq. km	Mining activities, infrastructure development, and shifting cultivation
Assam	190 sq. km	202 sq. km	+12 sq. km	Urban expansion, logging, and agricultural pressures
West Bengal	145 sq. km	156 sq. km	+11 sq. km	Agricultural expansion, encroachments, timber extraction
Madhya Pradesh	142 sq. km	155 sq. km	+13 sq. km	Deforestation due to agriculture, urbanisation, and timber extraction
Chhattisgarh	115 sq. km	130 sq. km	+15 sq. km	Mining, urbanisation, agricultural expansion
Uttarakhand	95 sq. km	115 sq. km	+20 sq. km	Development of tourism infrastructure, road building, illegal logging
Karnataka	80 sq. km	90 sq. km	+10 sq. km	Expansion of agriculture, infrastructure development

Source: Forest Survey of India, India State of Forest Report 2021

Clues for the paragraph:

- Comparison of forest loss in selected Indian States between 2017–2019 and 2019–2021.
- Key Changes: States with the largest increase or decrease in forest loss
- Common causes like shifting cultivation, urban expansion, and illegal logging.
- Improvements - where forest loss decreased, possibly due to conservation efforts.
- Summary of trends and their environmental impact.

UNIT: 5 Answer Key

Section A (Literature)

1. a)
2. b)
3. c)
4. d)

5. False. The loaves of bread were bought by the maid-servant of the house. The children were more excited about the bread-bangles and sweet bread, which they carefully chose for themselves.

6. The movement of trees symbolises the struggle for freedom and the need for nature to reclaim its space, representing a fight against human dominance.

7. The writer calls the tea gardens a "magnificent view" because they stretch as far as the eye can see, with rows of tiny green tea plants. The backdrop of wooded hills, the shade trees, and the workers moving among the plants make the scene very beautiful.

8. The poet uses images like “silent trees”, “smell of leaves and lichen”, and “the still night” to build an atmosphere of quiet suspense. The silence reflects the calm before a powerful act of liberation.

9. The life of a baker in Goa and a tea plucker in Assam is different yet connected to local traditions. The baker in Goa was an important part of village life. He would visit houses daily, selling fresh bread, and was respected by everyone. His job provided stability, and he enjoyed a friendly bond with the people.
On the other hand, tea pluckers in Assam work long hours in tea gardens, picking tea leaves with great skill. Their work is physically demanding, and they often earn low wages. Unlike bakers, they do not have direct contact with consumers. However, both jobs are deeply rooted in culture—bread in Goa and tea in Assam. Both professions require dedication and are vital to the local economy.

Section B (Grammar)

1. Each student in the class must submit the project by Friday.
   Determiner: *Each*
   Type: Distributive

2. Which of the books do you prefer — fiction or biography?
   Determiner: *Which*
   Type: Interrogative

3. I have invited three friends to my birthday party.
   Determiner: *Three*
   Type: Numbers

4. Whose pen is this on the table?
   Determiner: *Whose*
   Type: Interrogative

5. Every parent was asked to attend the meeting.
   Determiner: *Every*
   Type: Distributive

6. Only one of the options was correct.
   Determiner: *One*
   Type: Numbers

7. He read all of the novels in the series.
   Determiner: *All*
   Type: Distributive

8. Which shirt are you going to wear for the function?
   Determiner: *Which*
   Type: Interrogative

9. Either of the twins is taller than the other.
   Determiner: *Either*
   Type: Distributive

10. She has planted six rose bushes in her garden.
    Determiner: *Six*
    Type: Numbers

Section C (Writing)

Since creative writing tasks are subjective, the answers will vary from student to student. Some aspects to consider while evaluating an analytical paragraph are:

- Does the paragraph start with a clear and focused topic sentence?
- Does the paragraph go beyond summary and show critical thinking?
- Does the paragraph stay focused on one main idea?
- Are linking words or phrases used effectively to connect ideas (e.g., furthermore, in contrast, this shows that)?
- Is there a variety of sentence structures and vocabulary?
- Does the paragraph end with a sentence that summarises or reinforces the main point?
- Does it offer a concluding thought or insight based on the analysis?

Learning Level Tracker

Keep a record of unit assessment results in the tracker.

As you conduct assessments based on the activities suggested, put a tick mark as per the following:

Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: English		
Roll No.	Name of the Student	Unit: 5		
		Chapters:	1. Glimpses of India	
			2. The Trees	
		Level 1	Level 2	Level 3

UNIT : 7
Chapters : Madam Rides the Bus, The Tale of Custard the Dragon

Activity 1 Timeless Games

35 mins

Instructions

- Provide printouts of the passage below or you may write it on the board.
- Ask students to read the passage.

Timeless Games

Children often play games that are passed down through generations and remain an integral part of their childhood. Deeply connected to the environment and community, they help children develop physical skills, foster friendships, and keep traditions alive, all while making use of the natural resources available in their surroundings. Here are ten examples of such games commonly played by children around us:

- ***Ukrong (Tag)**: A traditional game where one child is "it" and must tag others who try to avoid being caught. Played in open fields, often amidst the dense vegetation found in rural areas.*

- ***Langdii (Hopscotch)**: Children draw squares on the ground and take turns hopping between the numbered boxes without stepping on the lines. The game is often played on dirt paths or courtyards in villages.*

- ***Pee-Tree (Hide and Seek)**: A classic game where one child counts while others hide behind trees, rocks, or in the thick underbrush typical of rural landscapes. The seeker must find all the hidden players.*

- ***Kabaddi**: A popular game where two teams compete. One player from the attacking team enters the opposing team's half, tries to touch a player, and returns without being caught. It requires no equipment, just an open space, and is often played in fields or near village outskirts.*

- ***Seven Stones (Lagori)**: A game where one team knocks down a pile of seven stones with a ball, and the other team tries to rebuild the stack before being hit. It is commonly played by children in village playgrounds or open fields.*

- ***Chhereh (Catch the Ball)**: Children toss a ball into the air while others try to catch it. It's a simple yet active game played in open spaces, often near the edge of a forest or a village square.*

- ***Nukhla (Leapfrog)**: A group of children forms a line, and one child bends over while others leap over them. The game is often played in fields or grassy areas.*

- ***Dukar (Duck Duck Goose)**: Children sit in a circle, and one child walks around tapping the others' heads while saying "duck" until they choose one to be the "goose." The "goose" then chases the tapper around the circle.*

- ***Rolling Tyre**: Children often use discarded tyres and roll them down hills or across flat areas. The goal is to keep the tyre rolling for as long as possible, which is a simple yet competitive game.*

- ***Wangala (Harvest Dance)**: While not exactly a competitive game, the Wangala dance is an important cultural tradition. During the harvest season, children participate in the dance by forming circles and moving in rhythmic steps, mimicking the motions of harvesting crops. It is often performed during festivals in the village.*

- Divide the class into pairs and have them discuss which of the games in the passage they have played.
- Ask the pairs to write steps to play a game that they like, which is not there in the passage.
- Ask them to have a discussion on the advantages of playing such games. The discussion points can include physical fitness, teamwork, social skills, community, accessibility, and cost-effectivenes.
- After the activity, a few pairs should share with the class what they discussed and wrote about.

Activity 2 Tenses

35 mins

Instructions

- Explain the concept of Tenses to the class. You can refer to the notes below.

Teacher's Notes

Tenses indicate the time of an action, event, or state of being.
Examples:
Past: The team completed the assignment ahead of schedule.
Present: He attends a specialised learning programme every quarter.
Future: They will organise the conference next month.

Simple, Continuous, Perfect, Perfect Continuous Tense:

Simple Tense
Present Simple: She plays football every day.
Past Simple: He visited his grandmother yesterday.
Future Simple: They will travel to London next week.

Continuous Tense
Present Continuous: I am reading a book now.
Past Continuous: We were watching a film last night.
Future Continuous: She will be studying at 8 p.m.

Perfect Tense
Present Perfect: They have finished their homework.
Past Perfect: He had already left when I arrived.
Future Perfect: By tomorrow, we will have completed the project.

Perfect Continuous Tense
Present Perfect Continuous: I have been working all morning.
Past Perfect Continuous: She had been waiting for an hour before the bus came.
Future Perfect Continuous: By next year, he will have been teaching for ten years

- For class preparation, you may write some sentences on pieces of paper or may write them on the board.
- Divide the class into pairs.
    - Student A reads a sentence. Student B should identify the correct tense used in the sentence and say a new sentence using the same tense correctly.
    - Then they swap roles, and Student B gives the next sentence.
    - Example Round:

A: *They had been walking for hours.*
B: *That's Past Perfect Continuous. My sentence: I had been studying since morning.*
Then they switch roles.

- You may use the following sentences as prompts, or let students create their own sentences.
    - *I go to school by bus every day.*
    - *She is painting a beautiful picture.*
    - *They had finished the test before the bell rang.*
    - *We will visit the museum next weekend.*
    - *He was sleeping when the phone rang.*
    - *I have eaten all the biscuits!*
    - *By 2025, they will have completed the bridge.*
    - *She had been crying for hours.*
    - *We are studying English grammar now.*
    - *He plays the guitar very well.*
    - *They were playing football in the rain.*
    - *I will be staying with my aunt this summer.*
    - *She has been working hard lately.*
    - *The baby cried loudly last night.*
    - *I had left before she arrived.*
    - *We will have been travelling for five hours by then.*
    - *They have known each other for years.*
    - *He will go to the library tomorrow.*
    - *I was reading when you called.*
    - *She had been baking since morning.*

- You may decide how many sentences each pair should work on, depending on the number of students and time availability.
- During the activity, go around the class and guide the students wherever required.
- After the activity, a few students can share their experiences, and doubts can be cleared about Tenses.

Activity 3 Story Writing

35 mins

Instructions

- Remind the students about basic guidelines for writing a story based on a situation. You can refer to the teacher's notes for the same.
- Divide the class into groups of 4-5 students.
- Tell the groups that they will each write a story on the topic: ***The Tale of Timmy the Tortoise.***

- *Ask them to follow a story structure, use* **humour,** and a **surprising twist.**
  You can refer to the structure as below and explain the structure.

Story Structure

Introduction (Opening):
Describe the setting, time, and place. Introduce the character(s): Provide brief background information about the main character. Start the story with action or intrigue to grab the reader's attention.

Rising action and building the plot:
Present the challenge, problem, or conflict that the character faces.

Climax:
The turning point of the story is where the character faces their biggest challenge or makes an important decision. This is the moment of highest tension or conflict.

Falling action:
The events leading towards the resolution. The problem is being solved, or lessons are learned.

***Conclusion (Ending)*:**
The final part of the story, where everything is resolved. You can offer a reflection, a lesson learned, or a feeling of closure.

- Write the following story starter on the board as a prompt for the students:

There was once a quiet little tortoise named ***Timmy*** *who lived with a group of loud, boastful animals – a parrot, a monkey, and a cat – who always talked about how brave they were. Timmy, however, was shy and often laughed at for hiding in his shell. But one day, when something truly frightening happened, the bold animals ran away in fear, and Timmy did something no one expected.*

- After the groups finish their stories, ask them to share their stories.
- After each presentation, share your feedback.

Teacher's Notes

- ***Understand the situation thoroughly.*** Read and understand the situation prompt. Identify the key elements, such as setting, characters, conflict, and resolution. Think about how you can develop the story based on the situation. Consider how the situation can evolve, the challenges your character might face, and how the story can end.
- ***Develop characters and dialogue:*** Introduce interesting and relatable characters. Make sure the main character has a clear goal, motivation, and conflict. Use dialogue to move the plot forward and reveal character traits.
- ***Use descriptive language and sensory details:*** Describe what the character sees, hears, smells, tastes, and feels to make the story more immersive. This helps the reader connect with the story and imagine the scene.
- ***Maintain consistent point of view and tense:*** Decide if the story will be told in the first person (I, we) or third person (he, she, they). Ensure the point of view is consistent throughout the story. Choose the appropriate tense (past or present) and stick with it throughout the narrative.
- ***Focus on the conflict and resolution:*** A story without conflict is often dull. The conflict could be internal.
- ***Stay on topic and be relevant:*** Ensure your story is directly related to the situation given.
- ***Proofread and edit*:** Read through the story carefully to check for errors. Make sure your sentences are clear and well-structured. Avoid overly long sentences that may confuse the reader. Pay attention to punctuation marks like commas, periods, quotation marks, etc., especially when using dialogue.
- ***Be creative and original:*** A good story often has a surprising or unique twist. Think of something unexpected that could happen in the given situation. Let your voice come through in the writing. Your creativity, personality, and style will make the story unique and enjoyable to read.

UNIT: 7 Assessment

35 mins

Section A (Literature)

Choose the correct answer from the given options:

1. What was the most fascinating thing for Valli?
   a) Playing fun games outside
   b) Watching people on the road
   c) The bus going to the town
   d) Talking to friendly travellers

2. How did the conductor treat Valli?
   a) Rudely
   b) Indifferently
   c) Politely and playfully
   d) Ignored her completely

3. What brave act did Custard perform in the poem?
   a) He rescued Belinda from drowning.
   b) He chased away the other pets.
   c) He fought and killed a pirate.
   d) He flew to save the town.

4. What does the poem highlight about bravery?
   a) Bravery is only about looks.
   b) Only small creatures can be brave.
   c) Those who boast are always the bravest.
   d) True bravery is shown through actions, not words.

Read the following extracts and answer questions 5 and 6.

Extract 1
"Day after day she watched the bus, and gradually a tiny wish crept into her head and grew there: she wanted to ride on that bus, even if just once. This wish became stronger and stronger until it was an overwhelming desire. Valli would stare wistfully at the people who got on or off the bus."

5. In a sentence, write what the passage highlights.

Extract 2
" Belinda was as brave as a barrel full of bears,
And Ink and Blink chased lions down the stairs,
Mustard was as brave as a tiger in a rage,
But Custard cried for a nice safe cage."

6. Comment upon the contrast that is reflected in the above lines in the extract.

_____

_____

Answer the following:

7. How did Valli arrange money for her bus ride?

_____
_____

8. What is ironic about Custard the Dragon?

_____
_____

9. Describe how *Madam Rides the Bus* reflects a child's curiosity and independence.

_____
_____
_____
_____

10. How does the setting contribute to the overall mood of the poem, *The Tale of Custard the Dragon?*

_____
_____
_____
_____

Section B (Grammar)

Fill in the blanks with the correct tense form of the verb in brackets.

1. Every Saturday, the children _____ (play) games near the forest.
2. I _____ (climb) Shillong Peak last summer with my cousins.
3. We _____ (celebrate) Wangala festival for generations.
4. At this moment, she _____ (learn) a local dance in her village.
5. They _____ (collect) firewood when the rain suddenly started.
6. I _____ (never visit) Mawlynnong, but I would love to go someday.
7. By the time we reach Cherrapunji, it _____ (start) to rain.
8. The farmers _____ (work) in the paddy fields all morning.
9. He _____ (watch) the clouds roll over the hills when I called him.
10. Our school _____ (organise) a field trip to the Living Root Bridge next week.

Section C (Writing)

Complete the story given below. Give a title to the story:

During the school holidays, a group of friends set off to explore the forest near their village. They had heard tales of a hidden trail behind the waterfall that led to something mysterious. With a map and their backpacks, they began the adventure of a lifetime.

Give it a title too.

_____
_____
_____
_____

UNIT: 7 Answer Key

Section A (Literature)

1. c)
2. c)
3. c)
4. d)
5. The passage highlights Valli's strong desire and curiosity to experience a bus journey.
6. The contrast in the last two lines is between the bravery of the other pets and the cowardice of Custard. Ink and Blink are said to be fierce enough to chase lions, while Mustard is compared to an angry tiger. However, Custard, who is a dragon, behaves timidly and cries for safety, which is unexpected.
7. Valli saved money by not spending on sweets, balloons, or rides at the fair. She carefully collected small amounts until she had enough for a ticket.
8. Although Custard was often mocked for being a coward, he proved his true bravery when danger struck, while the others ran away in fear.
9. The story highlights Valli's strong desire to explore the world beyond her home. She carefully plans her journey, saves money, and experiences the excitement of travel alone. Her journey reflects her curiosity, independence, and sense of adventure. Despite her excitement, she also learns an important life lesson when she sees a dead cow on the road, which makes her realise that life has both joy and sorrow.
10. The setting of Belinda's little white house gives the poem a cosy and cheerful beginning, making the reader feel that it is a safe and happy place. This contrasts with the sudden danger that comes when the pirate appears. The lively descriptions of the house and its colourful characters set a playful and humorous mood, which is reinforced by the rhyming pattern. However, when the pirate enters, the mood briefly shifts to tension and action. In the end, the setting returns to normal, restoring the light-hearted tone. The poet effectively uses the setting to build contrast and make the events of the poem more engaging.

Section B (Grammar)

1. Every Saturday, the children **play** games near the forest.
2. I **climbed** Shillong Peak last summer with my cousins.
3. We **have celebrated** the Wangala festival for generations.
4. At this moment, she **is learning** a local dance in her village.
5. They **were collecting** firewood when the rain suddenly started.
6. I **have never visited** Mawlynnong, but I would love to go someday.
7. By the time we reach Cherrapunji, it **will have started** to rain.
8. The farmers **have been working** in the paddy fields all morning.
9. He **was watching** the clouds roll over the hills when I called him.
10. Our school **is organising** a field trip to the Living Root Bridge next week.

Section C (Writing)

Since creative writing tasks are subjective, the answers will vary from student to student. Some aspects to consider while evaluating a story - based on a situation are:

- The plot is the sequence of events that make up the story. It includes an introduction, rising action, climax, falling action, and conclusion.
- Characters are the people or beings that drive the story forward.
- The setting is where and when the story takes place.
- The conflict is the central problem or challenge the characters face.
- The theme is the central idea or message the story conveys.
- The point of view is the perspective from which the story is told.
- Dialogue is the conversation between characters.
- Style and Language - the way the story is written affects its tone and impact.
- Pacing refers to how quickly or slowly the events unfold in the story.
- Often, stories have a deeper moral or lesson for the reader.

Learning Level Tracker

Keep a record of unit assessment results in the tracker.

As you conduct assessments based on the activities suggested, put a tick mark as per the following:

Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: English		
Roll No.	Name of the Student	Unit: 7		
		Chapters:	1. Madam Rides the Bus	
			2. The Tale of Custard the Dragon	
		Level 1	Level 2	Level 3

UNIT : 8
Chapters : The Sermon at Benares, For Anne Gregory

Activity 1 Youth Employment in Meghalaya

35 mins

Instructions

- Divide the class into small groups.
- Print out the following passage and table and distribute them in groups. If you are unable to print it, you may write the passage on the board.

Youth Employment in Meghalaya

In Meghalaya, many young people aged 18 to 25 are working in different types of jobs. Some still do traditional work like farming, while others are moving into modern types of work, such as running shops or providing online services.

In rural areas, farming is still a big source of income. But in the last few years, more young people have started small businesses. These include tea stalls, tailoring shops, taxi driving, and mobile repair work. Skill training programmes by groups like the Meghalaya State Skill Development Society (MSSDS) have helped youth learn new skills and start their own work.

Some youth still hope to get government jobs. But because these jobs are few and very competitive, not everyone is successful. In towns like Shillong and Tura, more young people are joining the private sector—working in hotels, shops, tourism, and delivery services.

The table below shows estimated employment patterns for youth in Meghalaya, based on the Periodic Labour Force Survey (PLFS), 2022–23.

Employment Type	Examples	% of Youth
Self-employed	Shops, weaving, tailoring, taxi, online work	33%
Farming (own/family)	Paddy, betel nut, jhum farming	30%
Government jobs	Police, clerical, teachers, health workers	17%
Private sector	Hotels, delivery, retail, tourism, BPOs (customer service etc.)	13%
Unemployed (job seekers)	School leavers, fresh graduates	7%

Source: *Periodic Labour Force Survey (PLFS), Annual Report 2022–23, Ministry of Statistics and Programme Implementation, Government of India.*

- Ask the groups to read the passage and the table, and answer the following questions:
  - Self-employment and farming together cover over 60% of youth employment. What does this tell us about the work environment and opportunities for young people in Meghalaya?
  - The percentage of youth in government jobs is lower than in self-employment and farming. What might be some reasons for this?
  - What kind of jobs are increasing in towns like Shillong and Tura, and what does that suggest about urban employment trends?
- Ask the groups to take notes of the answers discussed in groups.
- Then ask the groups to share their answers with the whole class.

Activity 2 Subject Verb Concord

35 mins

Instructions

- Revise the concept of Subject Verb Concord with the class.
- Divide the class into small groups.
- Provide printouts of the following paragraph to the groups or write the same on the board.

In today's world, many people believe that appearance is everything. Social media and advertising create the idea that beauty means having perfect skin, fashionable clothes, or a certain body shape. As a result, young people sometimes feel pressure to look a certain way to be accepted or loved. But real confidence and happiness do not come from how someone looks. It comes from knowing your values, your strengths, and the kind of person you are. A kind heart and a strong mind are what truly make someone beautiful. People who understand this often treat others with more respect and kindness.

- Ask the groups to rewrite the paragraph using the correct Subject Verb Concord. Further, they should also explain for each correction why it was needed.
- After the activity, the groups should share their work with the whole class.

Activity 3 Formal Letter Writing

35 mins

Instructions

- Revise the concept of formal letter writing with the class.
- Then divide the class into small groups.
- Provide the groups with printouts of an incorrectly written formal letter or write the letter on the board.
- Ask the groups to read the letter and rewrite it after correcting.
- You can use one of the sample letters below or use your own to give to students:

Hi Sir,

We want to do a clean-up in our village one day. The area near the river is very dirty and has rubbish everywhere. We are planning to ask some villagers to help too. Please say yes fast and let us know if you'll come.

Bye,

Pema

Class 10

Dear Principal,

We don't have enough sports stuff. The football is torn, and there are no skipping ropes. We want new things so we can play properly. Some students get bored without games.

Please get some new things soon.

Thanks,

Tenzin Dorjee

Class 10

- After the activity, the groups should share their letter with the whole class.

UNIT: 8 Assessment

35 mins

Section A (Literature)

Choose the correct answer from the given options:

1. What is the main purpose of the Buddha's first sermon?
   a) To share the truth about suffering and the way to end it
   b) To encourage people to pray more
   c) To explain the importance of rituals
   d) To tell stories from his life
2. Why did Kisa Gotami go to the Buddha?
   a) She wanted to learn meditation
   b) She was looking for food
   c) She was in grief after losing her child
   d) She wanted to become a monk
3. What does Anne say she could do to avoid being loved for her hair?
   a) Cut it all off
   b) Braid it differently
   c) Dye it brown, black, or carrot
   d) Cover it with a scarf
4. Who, according to the poem, can love someone "for themselves alone"?
   a) A true friend
   b) God
   c) A poet
   d) A philosopher

Read the following extracts and answer questions 5 and 6:

Extract 1

"He wandered for seven years and finally sat down under a peepal tree, where he vowed to stay until enlightenment came. Enlightened after seven days, he renamed the tree the Bodhi Tree (Tree of Wisdom) and began to teach and share his new understandings. At that point, he became known as the Buddha (the Awakened or the Enlightened). The Buddha preached his first sermon at the city of Benares, the most holy of the dipping places on the River Ganges; that sermon has been preserved and is given here. It reflects the Buddha's wisdom about one inscrutable kind of suffering."

5. What qualities of the Buddha's character are shown in this extract?

_____
_____
_____
_____
_____
_____
_____

Extract 2

"Never shall a young man,
Thrown into despair
By those great honey-coloured
Ramparts at your ear,
Love you for yourself alone
And not your yellow hair."

6. What does the phrase "great honey-coloured ramparts" refer to in the extract?

_____
_____
_____

Answer the following:

7. Why did Kisa Gotami carry her son to all her neighbours?

_____
_____
_____
_____
_____

8. What does Anne Gregory's response reveal about her character?

_____
_____
_____
_____

9. How does Kisa Gotami's journey in search of mustard seeds help her understand the reality of life and death? Explain how her experience reflects Buddha's teachings on suffering and acceptance.

_____
_____
_____
_____
_____
_____
_____
_____
_____

10. How does the poem "For Anne Gregory" explore the theme of love and superficiality?

_____
_____
_____
_____
_____
_____
_____

Section B (Grammar)

Subject Verb Concord - Choose the Correct Option.

1. Each of the students ___ a different project.
   ☐ have ☐ has ☐ were ☐ do
2. The news ___ quite shocking.
   ☐ are ☐ have ☐ is ☐ be
3. Neither the teacher nor the students ___ late.
   ☐ is ☐ has been ☐ were ☐ was
4. The quality of the apples ___ not good.
   ☐ are ☐ were ☐ is ☐ have been
5. My trousers ___ in the cupboard.
   ☐ is ☐ are ☐ was ☐ has been
6. The committee ___ reached a final decision.
   ☐ have ☐ are ☐ is ☐ has
7. Ten kilometres ___ a long distance to walk.
   ☐ are ☐ is ☐ be ☐ were
8. The books on the table ___ mine.
   ☐ is ☐ was ☐ are ☐ has
9. Either Riya or her friends ___ going to help.
   ☐ is ☐ are ☐ was ☐ has
10. Mathematics ___ an interesting subject.
    ☐ are ☐ be ☐ is ☐ were

Section C (Writing)

Imagine that there is increasing traffic congestion in your town, and you are concerned about it. Write a letter to the editor of a local newspaper, in about 120 words, suggesting ways to manage the issue.

UNIT: 8 Answer Key

Section A (Literature)

1. a)
2. c)
3. c)
4. b)
5. The extract highlights the Buddha's determination, wisdom, and compassion. His decision to wander for seven years shows strong will and purpose. Sitting under the tree until he reached enlightenment shows deep commitment. After attaining wisdom, he chose to share his insights with others, showing kindness and a desire to help people understand and overcome suffering.
6. It refers to Anne Gregory's thick, golden-yellow hair falling around her ears like protective walls.
7. Kisa Gotami, devastated by the loss of her only son, carried his body to all her neighbours, desperately seeking medicine to bring him back to life. In her deep grief, she refused to accept his death and hoped for a cure.
8. Anne Gregory is independent and wants to be valued for who she truly is. She believes that changing her appearance might help people see beyond superficial beauty and love her for her personality.
9. Kisa Gotami's search for mustard seeds helps her understand the reality of life and death. Heartbroken, she believes Buddha can revive her son. Buddha asks her to collect mustard seeds from a house where no one has ever lost a loved one. As she visits each home, she realises that death is inevitable and affects every family. Watching city lights flicker and fade, she understands that life is temporary and fragile. Buddha's sermon teaches that grieving only increases pain, and wisdom lies in accepting life's realities. By letting go of sorrow, Kisa Gotami attains peace and enlightenment, embracing the path of Buddha's teachings and learning that suffering comes from attachment and resistance to life's truths.
10. The poem contrasts external beauty with true love. The young man believes no man can love Anne for who she truly is, only for her golden hair. Anne rejects this idea, saying she can change her hair colour to prove otherwise. However, the religious man asserts that only God can love a person for their true self, suggesting that human love is often influenced by external appearance. The poem highlights how society values superficial beauty, but true love should look beyond appearances.

Section B (Grammar)

1. Each of the students **has** a different project.
2. The news **is** quite shocking.
3. Neither the teacher nor the students **were** late.
4. The quality of the apples **is** not good.
5. My trousers **are** in the cupboard.
6. The committee **has** reached a final decision.
7. Ten kilometres **is** a long distance to walk.
8. The books on the table **are** mine.
9. Either Riya or her friends **are** going to help.
10. Mathematics **is** an interesting subject.

Section C (Writing)

Since creative writing tasks are subjective in nature, the answers will vary from student to student. Some aspects to consider while evaluating a formal letter are:

- **Purpose and Clarity:** ensuring there is clarity about why the letter is being written (e.g. making a request, raising a complaint, applying for something), yet remaining polite.
- **Layout and Format:** maintaining a standard layout and format, including sender's address, date, recipient's address, salutation, subject (optional), body of the letter, closing, and signature.
- **Tone and Language:** using a formal tone, being polite, using neutral language, and using active voice.
- **Grammar and Punctuation:** ensuring correct grammar, proper use of capitalisation, punctuation, sentence structure, and avoiding contractions.
- **Avoiding Ambiguity:** ensuring the purpose is clear, and avoiding unnecessary
- **Professionalism:** using appropriate titles (e.g. Mr., Ms., Mrs., Dr., Sir) when addressing the recipient, avoiding emotive language or jokes, and maintaining a respectful and professional tone at all times.
- **Length:** keeping the letter concise
- **Proofreading:** after writing, always proofread the letter to check for any spelling, grammar, or punctuation errors.

Learning Level Tracker

Keep a record of unit assessment results in the tracker.

As you conduct assessments based on the activities suggested, put a tick mark as per the following:

Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: English		
Roll No.	Name of the Student	Unit: 8		
		Chapter:	1. The Sermon at Benares	
			2. For Anne Gregory	
		Level 1	Level 2	Level 3

UNIT : 9
Chapters : The Proposal

Activity 1 Pausing Before You React

35 mins

Instructions

- Provide printouts of the passage below, or you may write it on the board.
- Ask students to read the passage.

Pausing Before You React

Sometimes, when someone says something we don't agree with, we react too quickly. Our first instinct might be to interrupt, defend ourselves, or prove a point. But very often, the situation changes when we take a moment to pause and listen carefully.

Pausing does not mean staying silent forever. It means taking a short step back to understand where the other person is coming from. It allows us to think before we speak. This small habit can make a big difference—not only in avoiding misunderstandings but also in building stronger friendships and family bonds.

At school, at home, or in our community, we meet people who think differently. That's natural. What matters is how we respond. Choosing calm over conflict, and listening over shouting, shows maturity and respect. These are not signs of weakness, but of strength.

- Divide the class into small groups.
- Tell them that based on the passage, they have to decide whether the following statements are true or false, and why. Then you can either read the statements (so the groups can write them in their notebooks) or you can write them on the board.

Statements:

1. Pausing before we react can help avoid misunderstandings.
2. The passage says we should never speak when we are angry.
3. Even a short pause can change how a conversation goes.
4. Pausing means we are ignoring the other person.
5. Taking a moment to think shows strength and self-control.
6. The passage says silence is always the best answer.
7. The habit of pausing can improve friendships and family bonds.
8. Reacting too quickly can sometimes make problems worse.
9. The passage encourages us to avoid all disagreements.
10. Listening calmly is a way to show respect.

- After the activity, the groups should share with the class what they discussed and wrote about.

Activity 2 Reported Speech

35 mins

Instructions

- Explain the concept of Reported Speech to the class. You can refer to the notes below.

Teachers' Notes

Reported Speech, also called Indirect Speech, is used to convey what someone else has said without quoting their exact words. It involves changing pronouns, verb tenses, and time expressions while removing the quotation marks.

Example:

Direct Speech: She said, "I am nervous."

Reported Speech: She said that she was nervous.

Guidelines

No Quotation Marks - In reported speech, we don't use quotation marks.

We do not copy the exact words.

Example:

Direct: He said, "I am busy."

Reported: He said that he was busy.

Change of Pronouns - Pronouns change based on who is speaking and who is being spoken to.

Example:

Direct: She said, "I like my job."

Reported: She said that she liked her job.

Tense Shift - When the reporting verb is in the past tense, the tense of the reported speech shifts:

Change in Tense	Direct Speech	Reported Speech
Present Simple → Past Simple	*"I often visit the art gallery on weekends," he said.*	*He said that he often visited the art gallery on weekends.*
Present Continuous → Past Continuous	*"I am currently working on a novel that explores themes of identity," she said.*	*She said that she was currently working on a novel that explored themes of identity.*
Present Perfect → Past Perfect	*"I have read all of Shakespeare's plays," Yinga said.*	*Yinga said that he had read all of Shakespeare's plays.*
Past Simple → Past Perfect	*"I travelled to six countries last year," Dami said.*	*Dami said that she had travelled to six countries the previous year.*

No Change of Tense - No tense change occurs when the reporting verb is in the present tense, or the information is universally true:

Direct: "The Earth revolves around the Sun," the teacher said.

Reported: The teacher says that the Earth revolves around the Sun.

Questions Change to Statements - Use if or whether for yes/no questions; use question words (what, where, why…) for other questions

Examples:

"Do you like tea?" → She asked if I liked tea.

"Where do you live?" → He asked where I lived.

Commands and Requests - Use verbs like told, asked, ordered, etc. Use to + verb or not to + verb for negative commands

Examples:

"Sit down." → The teacher told us to sit down.

"Don't shout." → He told her not to shout.

- Divide the class into pairs.
- Provide the following scenario to the students either through printouts or by writing on the board:

Daphi: "I'm feeling nervous about the school debate tomorrow."

Ribok: "Why? You speak so well!"

Daphi: "I haven't prepared much. I was busy with housework."

Ribok: "Would you like me to help you practice?"

Daphi: "Really? That would be great. Thank you, Ribok!"

Ribok: "Let's meet after lunch and go over your points together."

- Ask the students to convert it into a paragraph using Reported Speech. They should do this activity in pairs.
- After the activity, a few pairs can share their work with the class so that any confusion can be cleared.

Activity 3 Formal Letter Writing

35 mins

Instructions

- Revise the concept of formal letter writing with the class.
- Divide the class into small groups.
- Tell the groups that they have to convert the following informal messages (like on WhatsApp) into a formal letter.
- You can give them each one of the messages below, or they can choose one for their group:

Electricity Complaint: "Lights keep going off every night! What's going on? Someone fix this!"

Write a letter to the Electricity Board Officer complaining about the situation and requesting him to fix up the issue as soon as possible.

Road Repair Request: "The road near our school is full of potholes. Someone's going to fall. Do something soon! Write a letter to the Municipal Engineer requesting him to take steps to improve the condition of the road.

Rubbish Collection: "No one's come to clean our street for a week. It stinks. Please get someone here!"

Write a letter to the Sanitation Officer, Local Council, complaining about the situation and requesting him to take necessary actions.

School Library Request: "Can we please get more books in the library? Everyone's bored with the old ones! Write a letter to the School Principal requesting more books.

Internet Problem: "Our Wi-Fi stops working every evening! What's the point of paying for it?"

Write to the Local Internet Provider requesting them to take the necessary steps and fix up the matter.

- After the groups finish their letters, they can share them with the class.
- After each presentation, share your feedback.

UNIT: 9 Assessment

35 mins

Section A (Literature)

Choose the correct answer from the given options:

1. What is the main purpose of Lomov's visit to the Chubukovs' house?
   a) To borrow money
   b) To buy land
   c) To settle a dispute
   d) To propose marriage
2. What does Natalya argue about after the land dispute?
   a) The weather
   b) Their education
   c) Their dogs
   d) Her clothes
3. Why is Lomov worried about his health?
   a) He has a serious illness
   b) He is often nervous and gets palpitations
   c) He is injured from the war
   d) He cannot sleep due to stress
4. How does the play end?
   a) With the characters walking off angrily
   b) With a successful marriage proposal
   c) With Lomov falling unconscious
   d) With a legal case

Read the following extract and answer questions 5 and 6:

CHUBUKOV: [interrupting] My dear fellow... I'm so glad, and so on... Yes, indeed, and all that sort of thing. [Embraces and kisses Lomov] I've been hoping for it for a long time. It's been my continual desire. [Sheds a tear] And I've always loved you, my angel, as if you were my own son. May God give you both — His help and His love and so on, and so much hope... What am I behaving in this idiotic way for? I'm off my balance with joy, absolutely off my balance! Oh, with all my soul... I'll go and call Natasha, and all that.

LOMOV: [greatly moved] Honoured Stepan Stepanovitch, do you think I may count on her consent?

CHUBUKOV: Why, of course, my darling, and... as if she won't consent! She's in love; egad, she's like a lovesick cat, and so on.

Shan't be long!

5. What is Chubukov's initial reaction to Lomov's proposal?
   a) He becomes angry and refuses.
   b) He is overjoyed and emotional.
   c) He questions Lomov's intentions.
   d) He suggests waiting for Natalya's approval.

6. Complete the sentence with one word only.
   Chubukov describes Natalya as a _____ cat when expressing confidence that she will accept Lomov's proposal.

Answer the following:

7. Why does Chubukov initially misunderstand Lomov's visit?

   _____
   _____
   _____
   _____

8. What is the significance of the argument over Oxen Meadows?

   _____
   _____
   _____
   _____

9. How does the argument between Lomov and Natalya affect the marriage proposal?

   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

10. How does Anton Chekhov use humour and irony in The Proposal?

    _____
    _____
    _____
    _____
    _____
    _____

Section B (Grammar)

Change the following Direct Speech sentences to Reported Speech.

1. Daphi said, "We are visiting Shillong Peak this weekend."
   → _____
2. The teacher told Ribok and Pynshon, "Complete the report on bamboo weaving by Friday."
   → _____
3. Bah Kitbok said, "I have never been to Cherrapunji before."
   → _____
4. The forest officer warned, "Do not pluck flowers near the Sacred Grove."
   → _____
5. "My uncle lives in a village near Mawkyrwat," said Ka Rida.
   → _____

6. The nurse advised Babon, “You should drink warm water and rest.”
   → _____
7. “I will attend the Wangala Festival in Tura next month,” said Chinora.
   → _____
8. Tariang asked, “Have you ever tried jadoh or dohneiiong?”
   → _____
9. The guide explained, “This is one of the deepest caves in Jaintia Hills.”
   → _____
10. Papa said to me, “Take your raincoat. The clouds are low today.”
    → _____

Section C (Writing)

Imagine that you wish to participate in a cultural festival being organised in your district. Write a formal letter to the event organiser, enquiring about the registration process, event schedule, and participation fees.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

UNIT: 9 Answer Key

Section A (Literature)

1. d)
2. c)
3. b)
4. b)
5. b)
6. lovesick
7. Chubukov assumes that Lomov has come to borrow money because of his formal attire and nervous behaviour. He is surprised when Lomov instead asks for Natalya's hand in marriage. This misunderstanding adds humour and irony to the situation.
8. The argument over Oxen Meadows highlights human stubbornness and pettiness. Despite coming for a marriage proposal, Lomov and Natalya quickly become absorbed in proving ownership of the land, showing how trivial issues can overshadow important matters in life.
9. Lomov arrives at Chubukov's house to propose to Natalya, but their conversation quickly turns into an argument over Oxen Meadows. They both become so absorbed in proving ownership that they forget the purpose of the meeting. Chubukov also joins the fight, further intensifying the conflict. When Natalya learns that Lomov came to propose, she changes her attitude and urges her father to bring him back. However, even after the proposal is accepted, the couple continues to quarrel. This reflects Chekhov's use of humour and satire to show how trivial matters can overshadow important decisions.
10. Chekhov uses humour and irony to highlight human absurdity and trivial conflicts. The play begins with a formal marriage proposal but quickly turns into a heated argument over Oxen Meadows. Lomov's nervousness, Chubukov's sudden change in attitude, and Natalya's obsession with winning arguments create a humorous contrast. Ironically, even after accepting the proposal, Lomov and Natalya continue quarrelling, showing that their marriage will likely be filled with petty disputes. Chekhov satirises how people focus on minor disagreements rather than the bigger picture, making The Proposal an entertaining yet insightful comedy of manners.

Section B (Grammar)

1. Daphi said that they were visiting Shillong Peak that weekend.
2. The teacher told Ribok and Pynshon to complete the report on bamboo weaving by Friday.
3. Bah Kitbok said that he had never been to Cherrapunji before.
4. The forest officer warned them not to pluck flowers near the Sacred Grove.
5. Ka Rida said that her uncle lived in a village near Mawkyrwat.
6. The nurse advised Babon to drink warm water and rest.
7. Chinora said that she would attend the Wangala Festival in Tura the following month.
8. Tariang asked if I had ever tried jadoh or dohneiiong.
9. The guide explained that it was one of the deepest caves in Jaintia Hills.
10. Papa told me to take my raincoat as the clouds were low that day.

Section C (Writing)

Since creative writing tasks are subjective in nature, the answers will vary from student to student. Some aspects to consider while evaluating a formal letter are:

- **Purpose and Clarity:** ensuring there is clarity about why the letter is being written (e.g. making a request, raising a complaint, applying for something), yet remaining polite.
- **Layout and Format:** maintaining a standard layout and format, including sender's address, date, recipient's address, salutation, subject (optional), body of the letter, closing, and signature.
- **Tone and Language:** using a formal tone, being polite, using neutral language, and using active voice.
- **Grammar and Punctuation:** ensuring correct grammar, proper use of capitalisation, punctuation, sentence structure, and avoiding contractions.
- **Avoiding Ambiguity:** ensuring the purpose is clear, and avoiding unnecessary
- **Professionalism:** using appropriate titles (e.g. Mr., Ms., Mrs., Dr., Sir) when addressing the recipient, avoiding emotive language or jokes, and maintaining a respectful and professional tone at all times.
- **Length:** keeping the letter concise
- **Proofreading:** after writing, always proofread the letter to check for any spelling, grammar, or punctuation errors.

Learning Level Tracker

Keep a record of unit assessment results in the tracker.

As you conduct assessments based on the activities suggested, put a tick mark as per the following:

Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: English		
Roll No.	Name of the Student	Unit: 9		
		Chapter: The Proposal		
		Level 1	Level 2	Level 3

Meghalaya Learning Enhancement Programme

MATHS

Chapter 1 : Real Numbers

Activity 1 Prime Factor Puzzle

35 mins

Instructions

- Initiate the activity by a brief discussion on how a number can be broken down into smaller parts similar like a building is made up of many smaller bricks. Draw some visuals or numbers on the board.
- Divide the class into small groups of 3-4 students.
- Give each group a set of numbers (e.g., 36, 48, 60, 84, 90).
- Ask the groups to break down each number into its prime factors using a factor tree or division method. For example:
  - 36 → $2 \times 2 \times 3 \times 3$ or $2^2 \times 3^2$
- Once they factorise all their numbers, encourage them to compare their answers with other groups. Ask: "Did everyone get the same prime factors for the same number?"
- Discuss how this activity proves the Fundamental Theorem of Arithmetic—every number has a unique prime factorisation (ignoring the order of factors).
- Conclude by explaining:
  - Prime factorisation is useful in finding HCF (Highest Common Factor) and LCM (Lowest Common Multiple).
  - Every composite number can be broken down into a unique set of prime factors.

Activity 2 Rational vs. Irrational Adventure

35 mins

Instructions

- Start the activity by asking the students:
  - "Can you think of numbers that cannot be written as simple fractions?"
- Convey that today they will discover the difference between rational and irrational numbers through an activity.
- Write a list of numbers on the board:
  - For example: $\sqrt{5}$, 0.333..., 3.14159..., $\frac{22}{7}$, 4, $\sqrt{16}$ (You may change the list of numbers)
- Ask the class to work in pairs and classify these numbers as either rational or irrational.
- Guide them with the below hint:
  - "Can this number be written as a fraction of two integers?" (If yes, it is rational and if no, it is irrational)

- Discuss the correct classifications:
  - Rational: 0.333..., $\frac{22}{7}$, 4, √16 (examples)
  - Irrational: √5, 3.14159... (examples)
- Encourage students to explore: "Can a number be both rational and irrational?"
- Conclude the activity by highlighting:
  - Rational numbers can always be expressed as fractions and have either terminating or repeating decimals.
  - Irrational numbers cannot be written as fractions and have non-terminating, non-repeating decimals.

Activity 3 Decimal Expansion Investigator

35 mins

Instructions

- Ask the students and lead a discussion for 5-7 minutes:
  - Can you say which numbers have a decimal form that goes on forever while others stop?
  - Can you predict whether a fraction will have a terminating or repeating decimal?
- Explain that today they will learn to classify decimals as terminating or non-terminating repeating.
- Write some fractions on the board:
  - $\frac{1}{4}, \frac{1}{3}, \frac{7}{8}, \frac{5}{6}$ (You may change the numbers)
- Ask students to convert each fraction to its decimal form using long division.
- Guide them to identify which decimals terminate and which repeat indefinitely.
- Explain the rule:
  - If the denominator (in its prime factorised form) contains only 2 and/or 5, the decimal terminates.
  - Otherwise, the decimal repeats.
- Conclude by emphasising:
  - Rational numbers have either terminating or repeating decimals.
  - Knowing the denominator's prime factors helps predict the decimal form without division.

Assessment

35 mins

Answer the following questions:

1. For integer 'm', form of every even integer is:
   a) m
   b) m+1
   c) 2m
   d) 2m-1
2. If p and q are relatively prime, then their LCM is:
   a) 1
   b) p
   c) q
   d) p*q
3. If HCF of 306 and 657 is 9, then the LCM of these numbers is:
   a) 2236
   b) 2338
   c) 22338
   d) 757
4. The decimal expansion of a rational number is always:
   a) Non-terminating
   b) Non-terminating and non-repeating
   c) Terminating or non-terminating repeated
   d) None of these
5. The sum or difference of a rational number and an irrational number is:
   a) A rational number
   b) An irrational number
   c) 1
   d) 0
6. Using division method, express 5005 as a product of its prime factors.
7. Find the least number, which is exactly divisible by 15, 24 and 30.
8. Show that $2 + \sqrt{3}$ is an irrational number.
9. A circular pipe of length 120 cm needs to be divided into equal sections without leaving any remainder. What is the maximum possible length of each section?
10. What is the HCF of the smallest prime number and the smallest composite number?

Answer Key

1. (c) 2m
2. (d) p*q
3. (c) 22338
4. (c) Terminating or non-terminating repeated
5. (b) An irrational number
6. Using the division of a number by prime numbers method, we can get the product of prime factors of 5005.
   Hence, 5005 = 5 × 7 × 11 × 13 = 5 × 7 × 11 × 13
7. 15 = 3 × 5

   24 = 23 × 3

   30 = 2 × 3 × 5

   Thus, LCM = 23 × 3 × 5 = 120
8. Assume $2 + \sqrt{3}$ is rational, i.e., $2 + \sqrt{3} = \frac{p}{q}$ (where p and q are co-prime integers, and $q \neq 0$).
   $\sqrt{3} = (\frac{p}{q}) - 2 \Rightarrow \sqrt{3}$ is a rational number.
   This contradicts the fact that $\sqrt{3}$ is irrational. Therefore, $2 + \sqrt{3}$ is irrational.
9. Prime factorisation of 120 = $2^3 \times 3 \times 5$

   The maximum length of each section is the HCF of the prime factors, which is 1. Hence, the maximum possible length is **1 cm**.
10. The smallest prime number = 2

    The smallest composite number = 4

    Prime factorisation of 2 = 2

    Prime factorisation of 4 = 2 × 2

    HCF of 2 and 4 is = 2

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Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Real Numbers		
		Level 1	Level 2	Level 3

Chapter 2 : Polynomials

Activity 1 Graph It Out

35 mins

Instructions

- Start the activity with a brief discussion on a roller coaster track, where it moves up and down.

  Share that today we are going to plot some polynomial graphs and see where they touch the x-axis to understand the meaning of **zeroes of a polynomial**.
- Divide the class into groups of 3-4 students. Each group will get a different quadratic polynomial to work on. Either you take the below polynomials or any other as per your wish.
  - f(x) = x2−4
  - g(x) = x2+x−6
  - h(x) = x2+1
- Ask each group to substitute different values of x in their polynomial equation to find the corresponding y-values.

  For the equation, f(x)=x2−4,

  If x = -3, then f(x) = (-3)2 – 4 = 5

  If x = 2, then f(x) = 22 – 4 = 0

  They will complete this for values from -5 to 5.
- Using graph paper, students will be asked to **mark the points** obtained in the table and will then **join the points smoothly** to form a **parabola**.
- After that they will observe where the curve crosses the **x-axis** and mark those points, these points represent the **zeroes of the polynomial** because at these points y=0.
- Discuss the findings and highlight the key learnings:
  - If the parabola **touches the x-axis at one point**, it means the equation has **one repeated root**.
  - If it crosses **the x-axis at two points**, it means there are **two distinct real roots**.
  - If the curve **does not touch the x-axis**, the polynomial has **no real roots**.

Activity 2 Build the Equation!

35 mins

Instructions

- Start the class by a small ice-breaking question for the students:
  "Could you create an entire equation with only two numbers?"
- Ask students to make pair and follow the next steps:
  - Each pair gets a **set of two zeros**, for example: (2, -3) or ($\frac{1}{2}$, -4) or (-1, -2)
- Explain the formula: If **α** and **β** are the zeroes, then the equation is f(x) = k (x- α) (x - β)
- Expand the equation, such that for zeros 2 and –3, the equation will be f(x) = (x – 2) (x – 3) = x^2 + x - 6
- Ask the students to compare their expanded equation with $ax^2 + bx + c$ and identify the coefficients.
- Conclude the activity by highlighting that Zeroes determine the structure of a polynomial.

Activity 3 Zeroes in Motion – A Real-Life Experiment!

35 mins

Instructions

- Begin the class by some ice-breaking questions like:
  - Have you thrown a ball in the air?
  - Did you notice how it **rises, stops and then falls**?
  - This motion follows a polynomial equation! Today, we will discover and model this motion.
- Ask students to throw a ball in the air and observe its motion first.
- As the motion is parabolic, refer the concept of physics and connect them to the quadratic polynomial:
  - Equation of Motion: $h(t) = -t^2 + 4t$
  - Zeroes occur when the ball is at ground level.
  - Solve $-t^2 + 4t = 0$
- Ask them to factorise, either individually or in group.
  - Factorise: t (t – 4) = 0
  - Zeroes are t = 0 and t = 4 (start and end points).
- Conclude the activity by highlighting the significance of the zeros and its application in real world.

Assessment

60 mins

Answer the following questions:

1. Sum of zeroes of the polynomial $p(x) = x^2 - 3x + 2$ is:
   a) 2
   b) 3
   c) -2
   d) -3
2. If the graph of the polynomial y = p(x), where it does not intersect the x- axis then the number of zeros is:
   a) 1
   b) 2
   c) 3
   d) No Zeroes
3. The degree of a zero polynomial is:
   a) Always zero
   b) Never zero
   c) Negative
   d) Undefined
4. If the graph of $y = x^2 - 2x - 35$ cuts the x- axis at (7, 0) and (- 5, 0) then the zeroes of the polynomial $x^2 - 2x - 35$ are:
   a) 7, -5
   b) 0, -5
   c) 0, 7
   d) 0, 0
5. For any polynomial p (x), if p (a) =0, then 'a' is called:
   a) Constant of the polynomial
   b) Zero of the polynomial
   c) Degree of the polynomial
   d) coefficient of the polynomial
6. Find the value of "p" from the polynomial $x^2 + 3x + p$, if one of the zeroes of the polynomial is 2.
7. Find the quadratic polynomial if its zeroes are 0, $\sqrt{5}$.
8. If 4 is a zero of the cubic polynomial $x^3 - 3x^2 - 10x + 24$, find its other two zeroes.
9. Does the polynomial $a^4 + 4a^2 + 5$ have real zeroes?
10. α and β are zeroes of the quadratic polynomial $x^2 - 6x + y$.
    Find the value of 'y' if $3\alpha + 2\beta = 20$.

Answer Key

1. (b) 3
2. (d) No Zeroes
3. (d) Undefined
4. (a) 7, -5
5. (b) Zero of the polynomial
6. As 2 is the zero of the polynomial.
   We know that if α is a zero of the polynomial p(x), then p(α) = 0
   Substituting x = 2 in $x^2 + 3x + p$, $\Rightarrow 2^2 + 3(2) + p = 0 \Rightarrow 4 + 6 + p = 0 \Rightarrow 10 + p = 0 \Rightarrow p = -10$
7. A quadratic polynomial can be written using the sum and product of its zeroes as: $x^2 – (\alpha + \beta) x + \alpha\beta$ Where α and β are the roots of the polynomial.
   Here, α = 0 and β = $\sqrt{5}$ So, the polynomial will be: $x^2 – (0 + \sqrt{5}) x + 0(\sqrt{5}) = x\ 2 – \sqrt{5}x$
8. Given cubic polynomial is $p(x) = x\ 3 – 3x^2 – 10x + 24$ 4 is a zero of p(x). So, (x – 4) is the factor of p(x). Let us divide the given polynomial by (x – 4). Here, the quotient = $x\ 2 + x – 6 = x^2 + 3x – 2x – 6 = x (x + 3) – 2(x + 3)$ = (x – 2) (x + 3)
   Therefore, the other two zeroes of the given cubic polynomial are 2 and -3.
9. In the given polynomial, let $a^2 = x$.
   Now, the polynomial becomes, $x^2 + 4x + 5$
   Comparing with $ax^2 + bx + c$, here, $b\ 2 – 4ac = 4^2 – 4(1)(5) = 16 – 20 = -4$
   So, $D = b^2 – 4ac < 0$
   As the discriminant (D) is negative, the given polynomial does not have real roots or zeroes.
10. Let, $f(x) = x^2 – 6x + y$
    From the given, 3α + 2β = 20————————(i)
    From f(x), α + β = 6————————(ii)
    And αβ = y————————(iii)
    Multiply equation (ii) by 2.
    Then, subtract the whole equation from equation (i), => α = 20 – 12 = 8
    Now, substitute this value in equation (ii), => β = 6 – 8 = -2
    Substitute the values of α and β in equation (iii) to get the value of y,
    such as:
    y = αβ = (8) (-2) = -16

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Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Maths		
		Chapter: Polynomials		
Roll No.	Name of the Student	Level 1	Level 2	Level 3

Chapter 6 : Triangles

Activity 1 Are These Shapes Twins?

35 mins

Instructions

- Start with an engaging question and discuss it for 2-3 minutes:

  "Have you ever noticed that the image on a projector screen looks just like what's on the laptop but bigger?"

  Based on the discussion establish the concept of **similar figures**—objects that have the same shape but different sizes!
- **Group the students** and give each group **two sets of triangle cutouts**—one with **identical triangles** and another with **proportionally different triangles**.
- Ask students to **measure the angles** in each triangle and compare the corresponding ones and guide them to observe if the angles remain **equal** despite size differences.
- Now, instruct them to **measure and compare the sides** of each triangle and check if the ratio of corresponding sides is the same.
- Based on their observations, ask:
  - "Which triangles do you think are similar? Why?"
  - "Can you find any set where the sides are in proportion, but angles are not equal?"
  - Let students conclude that **similar triangles have equal angles and proportional sides**.
- Discuss and conclude by explaining **real-world applications** of similarity:
  - **Scaled models of buildings** used by architects.
  - **Enlarged or reduced images** in digital editing.
  - **Maps and blueprints**, where measurements are scaled down.
  - Similar figures maintain **equal angles** and proportional sides.
  - The concept is used in **photography, maps, architecture, and design**.

Activity 2 Divide and Conquer!

35 mins

Instructions

- Start the activity by asking the students:

  "Imagine a ladder leaning against a wall. If I place a horizontal plank at different heights, the ladder gets divided into different sections, but the ratios remain the same. Can we prove this mathematically?"
- Give each student a rectangular piece of paper.

- Instruct students to **fold the paper diagonally**, creating a **triangle**.
- Ask them to **fold another crease parallel to one side** inside the triangle.
- Have them **measure and compare** the segments formed on the two sides.
  - "What do you notice? Are the segments divided in the same ratio?"
- Guide students to conclude:
  - "A parallel line inside a triangle divides the two sides proportionally!"
  - This is known as **Thales' Theorem or Basic Proportionality Theorem**.
- Explain the real-world applications:
  - **Railway tracks** – Tracks and sleepers maintain proportional distances.
  - **Shadows of objects** – The height of a person and a lamp post create similar triangles.
- Wrap up by highlighting:
  - **Thales' Theorem (Basic Proportionality Theorem)** helps divide triangles proportionally.
  - Used in **construction, road designs, and perspective drawings**.

Activity 3 The Magic of Triangles!

35 mins

Instructions

- Start the activity with a question:

  "Do you know that just knowing two angles of a triangle is enough to determine its shape? Can anyone explain it to us?"
- Provide students with:
  - Graph paper
  - Rulers and protractors
- Ask them to **draw any triangle** and label it **ABC**.
- Instruct them to **scale down the triangle proportionally** to get a smaller triangle **A'B'C'** (by dividing each side length by 2).
- Now, students should measure and compare:
  - **Corresponding angles** – should be equal.
  - **Corresponding sides** – should be in proportion.
- Guide students in a way:
  - "Remember our starting question? Since the sum of angles in a triangle is always 180°, knowing two angles automatically determines the third. This means the triangles must have the same shape, making them similar!"

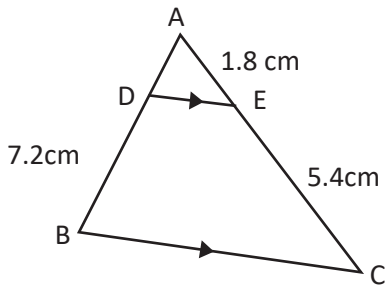
    Reinforce that this is the **AA (Angle-Angle) Similarity Criterion**.
- Discuss the real-life applications:
  - **Mobile screen enlargement**: How a smaller screen maintains proportions when enlarged.
  - **Mirrors and reflections**: Images in mirrors maintain similarity.
- Wrap up by telling:
  - **AA Similarity** helps prove triangles are similar without knowing side lengths.
  - Used in **optical illusions, architecture, and digital scaling**.

Assessment

60 mins

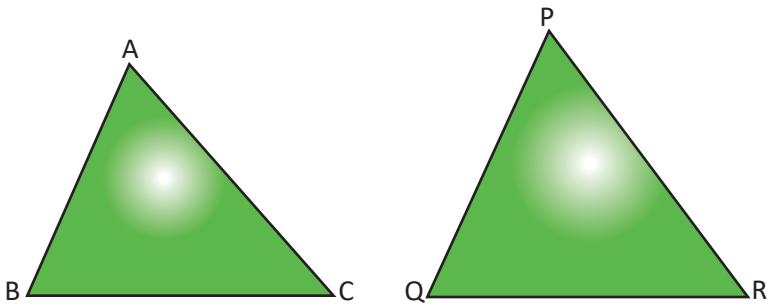
Answer the following questions:

1. All geometrical congruent figures are:
   a) Not similar
   b) Similar
   c) Unequal
   d) None
2. If ΔABC and ΔDEF are two triangles in which $AB/DE = BC/DF$ then the two triangles are similar if:
   a) ∠A = ∠F
   b) ∠B = ∠D
   c) ∠A = ∠D
   d) ∠B = ∠E
3. In a triangle, the line segment joining from one vertex to the midpoint of the opposite side is called its:
   a) Median
   b) Perpendicular
   c) Hypotenuse
   d) Angle bisector
4. Which of the following are not similar figures:
   a) Circles
   b) Squares
   c) Equilateral triangles
   d) Isosceles triangles
5. Which of the following is not a similarity criterion for two triangles?
   a) AAA
   b) SAS
   c) SSS
   d) ASA
6. The lengths of the diagonals of a rhombus are 24 cm and 32 cm. Calculate the length of the altitude of the rhombus.
7. In the figure, DE || BC. Find the length of side AD, given that AE = 1.8 cm, BD = 7.2 cm and CE = 5.4 cm.

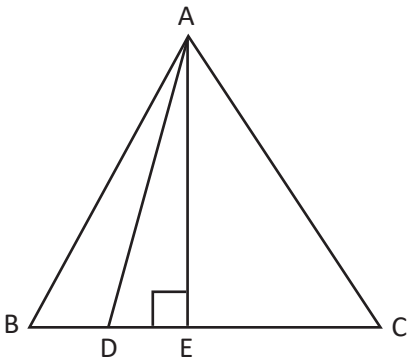


8. The sides of two similar triangles are in the ratio 7:10. Find the ratio of areas of these triangles.

9. If the areas of two similar triangles are equal, prove that they are congruent.



10. In an equilateral ΔABC, D is a point on side BC such that BD = $(\frac{1}{3})$ BC.
Prove that $9(AD)^2 = 7(AB)^2$



Answer Key

1. (b) Similar
2. (b) $\angle B = \angle D$
3. (a) Median
4. (b) Isosceles triangles
5. (d) ASA
6. Diagonals of a rhombus are $\perp$ bisectors of each other.

   $\therefore AC \perp BD, OA = OC = \frac{AC}{2} \Rightarrow \frac{24}{2} = 12$ cm, $OB = OD = \frac{BD}{2} \Rightarrow \frac{32}{2} = 16$ cm
7. Given, DE || BC AE = 1.8 cm, BD = 7.2 cm and CE = 5.4 cm

   By basic proportionality theorem, $\frac{AD}{DB} = \frac{AE}{EC}$,

   $\Rightarrow \frac{AD}{7.2} = \frac{1.8}{5.4} \Rightarrow AD = \frac{(1.8 \times 7.2)}{5.4} = \frac{7.2}{4} = 2.4$

   Therefore, AD = 2.4 cm.
8. Given, The ratio of sides of two similar triangles = 7:10

   We know that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

   The ratio of areas of these triangles = (Ratio of sides of two similar triangles) ^{2}

   = $(7)^2$:$(10)^2$ = 49:100

   Therefore, the ratio of areas of the given similar triangles is 49:100
9. To prove $\Delta ABC \cong \Delta PQR$.

   Proof: $\Delta ABC \sim \Delta PQR$

   $\therefore$ Area of (ΔABC)/Area of $(\Delta PQR) = \frac{BC^2}{QR^2} = \frac{AB^2}{PQ^2} = \frac{AC^2}{PR^2}$

   $\Rightarrow \frac{BC^2}{QR^2} = \frac{AB^2}{PQ^2} = \frac{AC^2}{PR^2} = 1$ [Since, ar (ΔABC) = ar(ΔPQR)]

   $\Rightarrow \frac{BC^2}{QR^2} = 1 \Rightarrow \frac{AB^2}{PQ^2} = 1 \Rightarrow \frac{AC^2}{PR^2} = 1$ BC = QR AB = PQ AC = PR

   Therefore, $\Delta ABC \cong \Delta PQR$ [SSS criterion of congruence]
10. Given, ABC is an equilateral triangle. And D is a point on side BC such that BD = $(\frac{1}{3})$BC.

    Let a be the side of the equilateral triangle and AE be the altitude of ΔABC.

    $\therefore BE = EC = \frac{BC}{2} = \frac{a}{2}$ And, $AE = \frac{a\sqrt{3}}{2}$

    Given, BD = 1/3BC $\therefore BD = \frac{a}{3}$ $DE = BE - BD = \frac{a}{2} - \frac{a}{3} = \frac{a}{6}$

    In ΔADE, by Pythagoras theorem, $AD^2 = AE^2 + DE^2 = [\frac{a\sqrt{3}}{2}]^2 + (\frac{a}{6})^2 = (\frac{3a^2}{4}) + (\frac{a^2}{36}) = \frac{(37a^2 + a^2)}{36} = \frac{(28a^2)}{36}$

    $= (\frac{7}{9})\, a^2 = (\frac{7}{9})\, (AB)^2$

    Therefore, $9(AD)^2 = 7(AB)^2$

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Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Triangles		
		Level 1	Level 2	Level 3

Chapter 7 : Coordinate Geometry

Activity 1 Find Your Distance!

35 mins

Instructions

- Start the class by asking students,

  "Have you ever wondered how Google Maps calculate the shortest distance between two places? Can anyone explain it?"

  Explain that today they will learn how to calculate distances mathematically on a coordinate plane.
- Set up the classroom as a coordinate grid:
  - Mark the floor with a grid (using tape or chalk) and label axes.
  - Assign coordinates to different positions in the classroom.
- Pair up students, each pair selects two points on the "classroom grid" and notes down their coordinates (e.g., A (2,3) and B (6,7)).
- Introduce the distance formula and demonstrate how to plug in values and calculate.
- Let students find distance between their chosen points and verify by measuring using the scale.
- Conclude with real world relevance, explain how the formula is used in GPS, sports, and designing city maps.
- Wrap up the activity by highlighting:
  - Distance between two points is always positive.
  - Discuss practical applications in real life (navigation, space missions, etc.).

Activity 2 Divide in Section!

35 mins

Instructions

- Begin the class by saying:

  "If two friends are 100 meters apart and one walks one-fourth of the total distance, where will they meet?"
- Introduce the section formula to the students, explain that it helps to find the coordinates of a point dividing a line segment in a given ratio.
- Start a Paper-Folding activity:
  - Distribute a rectangular sheet of paper to each student.
  - Draw a straight line and mark two points A and B.
  - Ask them to fold the paper at a point that visually seems to divide it in a 2:3 ratio.
  - Measure and compare their estimated point with the calculated section formula result.

- Give different coordinate points and ratios for students to solve, let them practice on the board.
- Wrap up the activity by:
  - Emphasizing on how division of a line is useful in scaling maps, blueprint designs, and animations.
  - Telling real-world applications (architecture, animation, GPS tracking).

Activity 3 Map the Treasure!

35 mins

Instructions

- Set the context with an engaging scenario and tell students:

  "Imagine you're a pirate and have found a treasure map! The treasure is buried inside a triangular region marked by three important landmarks. To claim your share, you need to determine the exact area of this region.

  Are you ready?"
- Distribute coordinate grids (graph paper) to students.:
  - Assign three random points A (x_1, y_1), B (x_2, y_2), and C (x_3, y_3) representing the triangular treasure zone.
  - Alternatively, let students choose their own three points on the grid.
- Guide them to apply the Triangle Area Formula.
- Let students verify and compare their results with a partner, meanwhile encourage the discussions among the students, say: “What happens when points are collinear?”
- Furthermore:
  - Ask students to create a different triangular region and calculate its area.
  - Let them swap their coordinates with classmates to verify each other's work.
- Wrap up the activity by:
  - Discussing how coordinate-based area calculations help in **mapping, architecture, and navigation (GPS systems)**.
  - Highlighting the **use of triangular decomposition in real-world land measurement**.

Assessment

60 mins

Answer the following questions:

1. The distance of the point P (3, 4) from the origin is:
   a) 4 units
   b) 3 units
   c) 5 units
   d) 7 units
2. The coordinates of the midpoint of the line segment joining the points A(a, b) and B(0, 0) is:
   a) $(\frac{a+b}{2}, a)$
   b) (a + b, b)
   c) $(\frac{a}{2}, \frac{b}{2})$
   d) (a, b)
3. If A (x1, y1), B (x2, y2) and C (x3, y3) are the three vertices of a triangle then area of a ΔABC is:
   a) $\frac{1}{2}|$ x1 (y2 – y3) + x2 (y3 – y1) + x3 (y1 – y2) |
   b) $\frac{1}{2}|$ x2 (y3 – y1) + x3 (y1 – y2) + x3 (y1 – y2) |
   c) $\frac{1}{2}$ | x3 (y2 – y1) + x2 (y3 – y1) + x1 (y3 – y2) |
   d) $\frac{1}{2}$ | x1 (y2 – y1) + x2 (y3 – y2) + x3 (y1 – y3) |
4. The abscissa of any point on the Y – axis is:
   a) -1
   b) 1
   c) 2
   d) 0
5. If A (- 1, 0), B (5, - 2) ad C (8, 2) are the vertices of a triangle ABC, then its centroid is:
   a) (6, 0)
   b) (0, 6)
   c) (4, 0)
   d) (12, 0)
6. Find the distance of the point P (2, 3) from the x-axis.
7. Find a relation between x and y such that the point (x, y) is equidistant from the points (7, 1) and (3, 5).
8. Find the value of k if the points A (2, 3), B (4, k) and C (6, –3) are collinear.
9. Name the type of triangle formed by the points A (–5, 6), B (–4, –2) and C (7, 5).
10. If A (-2, 1), B (a, 0), C (4, b) and D (1, 2) are the vertices of a parallelogram ABCD, find the values of a and b. Hence, find the lengths of its sides.

Answer Key

1. (c) 5 units
2. (c) $(\frac{a}{2}, \frac{b}{2})$
3. (a) $\frac{1}{2}$ | x1 (y2 – y3) + x2 (y3 – y1) + x3 (y1 – y2) |
4. (d) 0
5. (d) (4, 0)
6. We know that, (x, y) = (2, 3) is a point on the Cartesian plane in the first quadrant.
   x = Perpendicular distance from y-axis y = Perpendicular distance from x-axis.
   Therefore, the perpendicular distance from x-axis = y coordinate = 3
7. Let P (x, y) be equidistant from the points A (7, 1) and B (3, 5).
   Then, AP = BP AP 2 = BP 2
   Using the distance formula, $(x – 7)^2 + (y – 1)^2 = (x – 3)^2 + (y – 5)^2$
   $\Rightarrow x^2 – 14x + 49 + y^2 – 2y + 1 = x^2 – 6x + 9 + y^2 – 10y + 25$
   $\Rightarrow x – y = 2$
   Hence, the relation between x and y is x – y = 2.
8. Given, A (2, 3) = (x 1, y 1); B (4, k) = (x 2, y 2); C (6, -3) = (x 3, y 3)
   If the given points are collinear, the area of the triangle formed by them will be 0.
   $\Rightarrow \frac{1}{2}$ [x 1 (y 2 – y 3) + x 2 (y 3 – y 1) + x 3 (y 1 – y 2)] = 0
   $\Rightarrow \frac{1}{2}$ [2(k + 3) + 4(-3 -3) + 6(3 – k)] = 0
   $\Rightarrow \frac{1}{2}$ [2k + 6 – 24 + 18 – 6k] = 0 $\Rightarrow$ ½ (-4k) = 0 $\Rightarrow$ 4k = 0 $\Rightarrow$ k = 0
9. The points are A (–5, 6), B (–4, –2) and C (7, 5).
   Using distance formula, d = √ ((x 2 – x 1) 2 + (y 2 – y 1) 2)
   AB = $\sqrt{((-4+5)^2 + (-2-6)^2)} = \sqrt{(1+64)} = \sqrt{65}$; BC=$\sqrt{((7+4)^2 + (5+2)^2)} = \sqrt{(121 + 49)} = \sqrt{170}$; AC=$\sqrt{((7+5)^2 + (5-6)^2)} = \sqrt{144 + 1} = \sqrt{145}$
   Since all sides are of different lengths, ABC is a scalene triangle
10. Given vertices of a parallelogram ABCD are: A (-2, 1), B (a, 0), C (4, b) and D (1, 2)
    We know that the diagonals of a parallelogram bisect each other.
    So, midpoint of AC = midpoint of BD
    $\Rightarrow [\frac{(-2 + 4)}{2}, \frac{(1 + b)}{2}] = [\frac{(a + 1)}{2}, \frac{(0 + 2)}{2}]$
    By equating the corresponding coordinates, $2/2 = \frac{(a + 1)}{2}$ and $\frac{(1 + b)}{2} = \frac{2}{2}$
    a + 1 = 2 and b + 1 = 2 $\Rightarrow$ a = 1 and b = 1
    Therefore, a = 1 and b = 1.
    Let us find the lengths of sides of a parallelogram, i.e. AB, BC, CD and DA
    Using the distance formula, AB = $\sqrt{[(1 + 2)^2 + (0 – 1)^2]} = \sqrt{(9 + 1)} = \sqrt{10}$ units
    BC = $\sqrt{[(4 – 1)^2 + (1 – 0)^2]} = \sqrt{(9 + 1)} = \sqrt{10}$ units And CD = $\sqrt{10}$ and DA = $\sqrt{10}$ {the opposite sides of a parallelogram are parallel and equal}
    Hence, the length of each side of the parallelogram ABCD = $\sqrt{10}$ units.

Learning Level Tracker

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Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Coordinate Geometry		
		Level 1	Level 2	Level 3

Chapter 8 : Introduction to Trigonometry

Activity 1 Measuring Heights Without Climbing!

35 mins

Instructions

- Start with an engaging question:
  - o "Have you ever wondered how we measure the height of a tall tree or a building without actually climbing it?"
  - o "How do engineers and surveyors find the height of a mountain or the depth of a valley?"

    Today, we will discover a method that makes this possible—Trigonometry!
- Then take students outside to an open area where a tall object (e.g., flagpole, tree, or boundary wall) is visible.
- **Assign one student to participate** in the demonstration.
- Ask the student to use a school notebook or textbook:
  - o Instruct the student to hold the notebook **flat at eye level** and **tilt it upward slowly** while stepping back from the object.
  - o When the **top edge of the notebook points exactly at the top** of the object, **stop** and mark the student's position on the ground.
- Measure the **horizontal distance** between the student and the base of the object and the **height of the student's eyes** from the ground using a simple measuring tape or scale.
- Use the **tan θ = height/distance** formula to estimate the height of the object. Where **θ** is the measured angle of elevation, and **distance** is the horizontal distance between the observer and the base of the object.
  - o **Explain**: This formula comes from right-angle trigonometry, where **tan(θ) = opposite/adjacent**. Here, the object's height is the opposite side, and the distance from it is the adjacent. So, by measuring the angle and distance, we can find the height.
- **Compare this estimated height** with any known or measured height of the object (if available).
- Wrap up the activity by highlighting real world applications like **GPS, Land surveying, Astronomy, Satellite tracking**, etc.

Activity 2 Shadow Play

35 mins

Instructions

- Start by asking the students, a relatable situation:
  - o "Have you noticed how your shadow changes length at different times of the day?"

- "What if I told you that you can calculate the height of a lamp post just by looking at its shadow?" Let's try it out!

- Take students outside during a sunny day.
  - If it's cloudy or not feasible, use a torch or candle indoors to cast shadows of objects (like a pencil or stick) on a sheet of paper to perform the same measurements.
- Measure the height of one student and the length of their shadow.
- Measure the **shadow of a tall object** like a pole or a tree.
- Using similar triangles and trigonometry:
  - $\tan \theta$ = height/shadow length
  - Find the angle of elevation of the sun using the formula.
- Discuss how this principle is used in **architecture, astronomy, and timekeeping (sundials)**.
- Wrap up the activity by:
  - Showing how **angles of elevation and depression** are applied in real-world problems, from **aircraft navigation** to **civil engineering**.
  - Discussing the significance of trigonometry in designing solar panels based on the angle of the sun.

Activity 3 Building Right-Angled Triangle

35 mins

Instructions

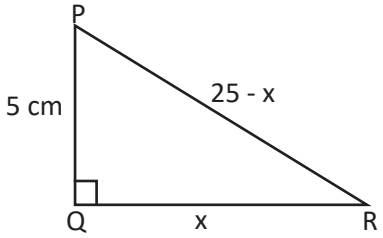
- Start with a question:
  - "Can we create our own right-angled triangles and test trigonometric formulas? Let's do it using just ropes and sticks!".
- Provide students with:
  - Strings
  - Measuring Tapes
- Ask them to form a **right-angled triangle** by measuring and tying three segments (e.g., 3m, 4m, 5m).
  - Explain them that according to the Pythagorean Theorem, if the square of the longest side (hypotenuse) equals the sum of squares of the other two sides, the triangle is a right triangle. So, using ropes of 3m, 4m, and 5m will always form a right-angled triangle when arranged properly.
- Have them check if **Pythagoras' Theorem** holds:
  - $a^2 + b^2 = c^2$
  - where, a and b are sides (base & altitude), and c is the hypotenuse.
- Introduce **trigonometric ratios** and ask them to calculate **sin, cos, tan** for different angles.
  - Note: Trigonometric ratios help us **find unknown angles and sides in right-angled triangles**, which is essential in fields like engineering, architecture, navigation, and physics.
- Compare their calculated values with a **trigonometry table**.
- Wrap up the activity by:
  - Discussing how right-angled triangles are used in **architecture, bridge construction, and satellite communication**.
  - Showing the importance of **Pythagoras' Theorem** in trigonometry.

Assessment

60 mins

Answer the following questions:

1. The value of $1 + \tan^2 45°$ is:
   a) -1
   b) 0
   c) 1
   d) 2
2. In ΔABC right angle at B, if AC = 13cm, BC = 5 cm and AB = 12 cm then sin A is equal to:
   a) $\frac{13}{5}$
   b) $\frac{5}{13}$
   c) $\frac{12}{13}$
   d) $\frac{13}{12}$
3. The relation between sin θ, cos θ and cot θ is:
   a) $\frac{\cos\theta}{\sin\theta} = \cot\theta$
   b) $\frac{\sin\theta}{\cos\theta} = \tan\theta$
   c) $\frac{\tan\theta}{\sin\theta} = \cos\theta$
   d) $\frac{\tan\theta}{\cos\theta} = \sin\theta$
4. If θ = 30° then the value of cos2θ – sin2θ is:
   a) 1
   b) $\frac{1}{2}$
   c) $\frac{-1}{2}$
   d) -1
5. Sin 2A = 2 sin A is true when A equals to:
   a) 0°
   b) 30°
   c) 45°
   d) 60°
6. Find the value of $\frac{(1-\tan^2 45°)}{(1+\tan^2 45°)}$
7. What is the value of $(Sec^2A - 1)\ (Cosec^2A - 1)$?
8. If cosec θ = $\frac{5}{4}$, find the value of cot θ.
9. If tan 2A = cot (A – 18°), where 2A is an acute angle, find the value of A.
10. In triangle PQR, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine the values of sin P, cos P and tan P.



Answer Key

1. (d) 2
2. (b) $\frac{5}{13}$
3. (a) $\frac{\cos\theta}{\sin\theta} = \cot\theta$
4. (b) $\frac{1}{2}$
5. (d) 0°
6. $\frac{(1-1^2)}{(1+1^2)} = \frac{(1-1)}{(1+1)} = \frac{0}{2} = 0$
7. $\tan^2A \times \cot^2A \Rightarrow \frac{\tan^2A \times 1}{\tan^2A} \Rightarrow 1$
8. We know that $\cot 2\theta = \operatorname{cosec} 2\theta - 1 = (\frac{5}{4})2 - 1 \Rightarrow \frac{25}{16} - 1 \Rightarrow 25 - \frac{16}{16}$
   $\cot^2\theta = \frac{9}{16} \Rightarrow \cot\theta = \frac{3}{4}$
9. Given, $\tan 2A = \cot(A - 18°)$
   As we know by trigonometric identities, $\tan 2A = \cot(90° - 2A)$
   Substituting the above equation in the given equation, we get:
   $\Rightarrow \cot(90° - 2A) = \cot(A - 18°)$
   Therefore, $\Rightarrow 90° - 2A = A - 18° \Rightarrow 108° = 3A \Rightarrow A = \frac{108°}{3}$
   Hence, the value of A = 36°
10. Given, In triangle PQR, PQ = 5 cm and PR + QR = 25 cm
    Let us say, QR = x $\Rightarrow$ PR = 25 – QR = 25 – x
    Using Pythagoras theorem:
    PR2 = PQ2 + QR2
    Now, substituting the value of PR, PQ and QR, we get:
    (25 – x)2 = (5)2 + (x)2
    252 + x2 – 50x = 25 + x2
    625 – 50x = 25
    50x = 600
    x = 12
    So, QR = 12 cm
    PR = 25 – QR = 25 – 12 = 13 cm
    Therefore,
    $\sin P = \frac{QR}{PR} = \frac{12}{13}$
    $\cos P = \frac{PQ}{PR} = \frac{5}{13}$
    $\tan P = \frac{QR}{PQ} = \frac{12}{5}$

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Name of the School:	**UDISE:**
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Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Introduction to Trigonometry		
		Level 1	Level 2	Level 3

Chapter 11 : Areas Related to Circles

Activity 1 The Pizza Problem

35 mins

Instructions

- Start the class by asking students,
  - "Imagine you and your friends have two circular paper plates. If I ask you to divide one into equal parts, how will you do it?"
  - "Now, if one plate is larger than the other, how can we compare how much more space it has?"

    Let's find out by learning about the area of circles!
- Bring **two different-sized circular lids, bangles, or cutouts from paper/cardboard** in the class.
- Measure the **radius** of both circles and note them down.
- Ask students to calculate the **area using $A = \pi r^2$**
- Compare the area of both circles and discuss:
  - Does doubling the radius double the area?
  - How does the area change with the increase in radius?
- Ask students to slice one of the circles into equal parts and rearrange it into a **rectangle-like shape** to show why the area formula works.
- Wrap up the activity by:
  - Discussing how **radius plays a crucial role** in the area of a circle.
  - Relating it to **real-life applications** like designing round tables, Ferris wheels, and circular gardens.

Activity 2 Playground Walk

35 mins

Instructions

- Begin the class by saying:

  "Have you ever seen a running track or a circular playground? How do we measure the boundary of such a round field?"

  Today, let's explore how to calculate the **circumference** of a circle!
- Take students to the **school playground** or any **circular track**.
  - If a circular track is not available, create one using white powder on the ground or draw a circle with chalk in the classroom.
- Ask one student to **walk around the boundary** of the circular track while another student measures the **diameter**.

- Use the formula **C=2πr** to **compare the estimated circumference with the actual steps taken** by the student.
- Let students try measuring the circumference of other circular objects like bicycle wheels or bottle caps in the classroom.
- Wrap up the activity by:
  - Discussing the role of circumference in **tire manufacturing, athletics tracks, and even astronomy**.
  - Explaining
  - how engineers use these calculations when designing roundabouts and tunnels.

Activity 3 Clock Decoded

35 mins

Instructions

- Ask the students in the class:

  "Have you ever looked at a clock and noticed how the hands move? The hour and minute hands sweep out different angles over time. But can we calculate the distance travelled by the tip of the minute hand?"

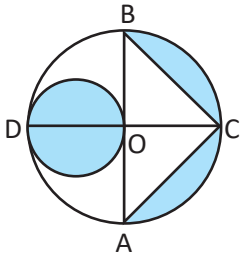
  Let's find out!
- Ask students to observe a **wall clock** with a **minute hand of known length (say 10 cm)**.
- Discuss how the **minute hand moves in a circular path**, forming **arcs every 5 minutes**.
- Use the formula **arc length** = $\frac{\theta}{360 \times 2\pi r}$ to calculate:
  - Distance travelled by the minute hand in **5 minutes (30° arc)**.
  - Distance in **15 minutes (90° arc)**.
  - Distance in **30 minutes (180° arc)**.
- Wrap up the activity by:
  - Discussing how c**locks are based on circle mathematics** and how **engineers use these principles in mechanical designs**.
  - Highlighting the importance of arc length in **navigation, GPS calculations, and astronomy**.

Assessment

60 mins

Answer the following questions:

1. The portion (or part) of the circular region enclosed by two radii and the corresponding arc is called the/an:
   a) Arc of the circle
   b) Perimeter of a circle
   c) Sector of a circle
   d) Segment of a circle
2. The Area of a circle is 49π cm2. Its circumference is:
   a) 7π cm
   b) 14π cm
   c) 21π cm
   d) 28π cm
3. The angle made by the minute hand of a clock at its centre in 15 minutes duration is:
   a) 600
   b) 1800
   c) 800
   d) 900
4. If the circumference of a circle increases from 2π to 4π, then its area is:
   a) Four times
   b) Triples
   c) Doubled
   d) Halved
5. In a circle of radius 21cm, an arc subtends an angle of 600 at the centre. The length of an arc is:
   (take $\pi = \frac{22}{7}$)
   a) 22 cm
   b) 44 cm
   c) 132 cm
   d) 231 cm
6. What is the area of a circle whose circumference is 44 cm?
7. Calculate the area of a sector of angle 60°. Given, the circle has a radius of 6 cm.
8. The cost of fencing a circular field at the rate of Rs. 24 per metre is Rs. 5280. The field is to be ploughed at the rate of Rs. 0.50 per m 2. Find the cost of ploughing the field (Take $\pi = \frac{22}{7}$).
9. In the figure, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If OA = 7 cm, find the area of the shaded region.



10. The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 minutes when the car is travelling at a speed of 66 km per hour?

Answer Key

1. (c) Sector of a circle
2. (b) 14π cm
3. (d) 900
4. (a) Four times
5. (a) 22 cm
6. Circumference of a circle = $2\pi r$

   From the question, $2\pi r = 44 \Rightarrow r = \frac{22}{\pi}$

   Now, area of circle = $\pi r^2 = \pi \times (\frac{22}{\pi})^2$

   So, area of circle = $\frac{(22\times22)}{\pi} = 154\ cm^2$
7. Given, The angle of the sector = 60°

   Using the formula, The area of sector = $(\frac{\theta}{360°}) \times \pi\ r^2$

   $= (\frac{60°}{360°}) \times \pi\ r^2\ cm^2 \Rightarrow$ area of the sector = $6 \times \frac{7}{22}\ cm^2 = \frac{132}{7}\ cm^2$
8. Length of the fence (in metres) = $\frac{\text{Total cost}}{\text{Rate}} = \frac{5280}{24} = 220$

   So, the circumference of the field = 220 m

   If r metres is the radius of the field, then $2\pi r = 220 \Rightarrow 2 \times (\frac{22}{7}) \times r = 220 \Rightarrow r = \frac{(220 \times 7)}{(2 \times 22)} \Rightarrow r = 35$

   Hence, the radius of the field = 35 m

   Area of the field = $\pi r^2 = (\frac{22}{7}) \times 35 \times 35 = 22 \times 5 \times 35\ m^2 = 3850$ sq. m.

   Cost of ploughing 1 m^2 of the field = Rs. 0.50

   So, the total cost of ploughing the field = 3850 × Rs. 0.50 = Rs. 1925
9. Radius of larger circle, R = 7 cm

   Radius of smaller circle, r = $\frac{7}{2}$ cm

   Height of ΔBCA = OC = 7 cm

   Base of ΔBCA = AB = 14 cm

   Area of ΔBCA = $\frac{1}{2} \times AB \times OC = \frac{1}{2} \times 7 \times 14 = 49\ cm^2$

   Area of larger circle = $\pi R\ 2 = \frac{22}{7} \times 7^2 = 154\ cm^2$

   Area of larger semicircle = $154/2\ cm^2 = 77\ cm^2$

   Area of smaller circle = $\pi r^2 = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = \frac{77}{2} cm^2$

   Area of the shaded region = Area of the larger circle – Area of a triangle – Area of larger semicircle + Area of the smaller circle

   $\Rightarrow$ Area of the shaded region = $(154 – 49 – 77 + 77/2)\ cm^2 = 66.5\ cm^2$
10. The radius of car's wheel = $\frac{80}{2} = 40$ cm (as D = 80 cm)

    So, the circumference of wheels = $2\pi r = 80\ \pi$ cm

    Now, in one revolution, the distance covered = circumference of the wheel = 80 π cm It is given that the distance covered by the car in 1 hr = 66km

    Converting km into cm we get, Distance covered by the car in 1hr = (66 × 10 5) cm

    In 10 minutes, the distance covered will be = $\frac{(66 \times 10\ 5 \times 10)}{60} = 1100000$ cm/s

    ∴ Distance covered by car = 11 × 10 5 cm

    Now, the no. of revolutions of the wheels = (Distance covered by the car/Circumference of the wheels) = $\frac{11 \times 105}{80\ \pi} = 4375.$

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Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Areas Related to Circles		
		Level 1	Level 2	Level 3

Chapter 13: Statistics

Activity 1 The Morning Commute – Average Travel Time

35 mins

Instructions

- Begin by setting a familiar scene:

  "Every day, we all travel to school – some walk, some take a cycle, others a bus. Let's find out how long each of us takes to reach school!"
- Before class, prepare slips and hand them to each student, asking them to write their **travel time (in minutes)** to school. Collect the slips.
- On the board, create intervals (like 0–10, 10–20, 20–30... up to 60) and invite students to come forward to tally the data into a grouped frequency table**.**
- Choose an **assumed mean** (say 30) and guide students through the **step deviation method** to calculate the **mean** step-by-step:
  - Find the midpoints (x_i) of each interval
  - Calculate the deviation from the assumed mean (A), i.e., ($x_i - A$)
  - Find the step deviation (u_i), where $u_i = (x_i - A) / h$, and h is the class width
  - Apply the formula: **Mean = A + ($\sum f_i u_i$ / $\sum f_i$) × h**
- Here:
  - f_i is the frequency,
  - u_i is the step deviation,
  - A is the assumed mean,
  - h is the class width,
  - x_i is the midpoint of each class interval.
- Once calculated, pose questions:
  - "How close is this average to your time?"
  - "Is the assumed mean we picked helpful?"
  - "Where could this be useful in the real world?"
- Wrap up the activity by telling the real world use as
  "This method is a powerful tool for analysts and researchers who handle grouped data daily."

Activity 2 Which Score Pops Up the Most?

35 mins

Instructions

- Start the activity by asking the students:
  "Let's say the class gave a surprise test. Which mark showed up the most?"
- Before class, prepare a fictional dataset of test marks (e.g., 10–20, 20–30, ..., 80–90) with random frequencies. Write it on the board.
- Guide students step-by-step:
  - Identify the modal class (the class interval with the highest frequency)
  - Apply the formula: Mode=$l+(f_1-f_0/2f_1-f_0-f_2)\times h$
- Here:
  - l = lower boundary of the modal class
  - f_1 = frequency of the modal class
  - f_0 = frequency of the class before the modal class
  - f_2 = frequency of the class after the modal class
  - h = class width
- Calculate and discuss:
  - "Is the mode always the most common value?"
  - "Can we have more than one mode?"
- Wrap up the activity by explaining the concept of mode as
  "Mode helps industries identify trends – like most popular shoe sizes, T-shirt sizes, etc."

Activity 3 Story of a Village – Understanding Median

35 mins

Instructions

- Start the activity with a scenario:
  "Imagine a small village in Meghalaya where 9 hardworking farmers recorded their daily income. Let's find out what a 'typical' day looks like for them!"
- Divide the class into teams of 4-5 students, each group will work together to solve the problem and discuss findings.
- Display the income data and write the following incomes on the board as:
  - ₹100, ₹150, ₹180, ₹200, ₹220, ₹250, ₹270, ₹300, ₹400
  - Tell students: **"These are the daily earnings (in rupees) of 9 farmers in the village."**
- Arranging the data:
  - Ask each group to **double-check** that the data is already arranged in ascending order (Explain: **Always arrange before finding the median!**).
- Find the median:
  - Guide them that Number of observations (n) = 9 (odd).
  - Median position = (n + 1)/2 = (9 + 1)/2 = 5th value.
  - Ask groups to find and announce:
    ➔ Median = ₹220

- Add a twist by saying: "Breaking news! A wealthy farmer from the neighbouring town just moved in. He earns ₹5000 a day!"
    - So, add ₹5000 to the list on the board.
    - New Data: ₹100, ₹150, ₹180, ₹200, ₹220, ₹250, ₹270, ₹300, ₹400, ₹5000
- Finding the new median:
    - Now, New n = 10 (even).
    - Median position = Average of 5th and 6th observations.
    - Formula for Median when n is even:
      Median=$((n/2)^{th}$ term+$(n/2 + 1)^{th}$ term)/2
    - Here, Median = (220 + 250)/2 = 235
- Also guide them to find mean as:
    - Total sum = ₹7070, n = 10
    - Mean = Total sum/n = ₹707
- Give each group **2 minutes** to discuss:
    - Which changed more: the mean or the median?
    - Why is median considered more "reliable" here?

Let them think a bit then discuss about it.
"The median gives a more honest picture when data includes extreme values. That's why economists, journalists, and researchers often prefer it — because it tells the real middle story!

Assessment

35 mins

1. While computing mean of grouped data, we assume that the frequencies are:
   a) centred at the class marks of the classes
   b) evenly distributed over all the classes
   c) centred at the upper limits of the classes
   d) centred at the lower limits of the classes
2. The _____ of a class is the frequency obtained by adding the frequencies of all the classes preceding the given class.
   a) Class mark
   b) Class height
   c) Average frequency
   d) Cumulative frequency
3. The method used to find the mean of a given data is(are):
   a) direct method
   b) assumed mean method
   c) step deviation method
   d) all the above
4. The empirical relationship between mean, mode and median in asymmetrical distribution is:
   a) Mode = 3 Median – 2 Mean
   b) Mode = 3 Median + 2 Mean
   c) Mode = 2 Median – 3 Mean
   d) Mode = Median – 2 Mean
5. Mode is:
   a) Least frequent value
   b) middle most value
   c) Most frequent value
   d) none of the above
6. Find the mean of the first 10 natural numbers.
7. Find the value of y from the following observations if these are already arranged in ascending order. The Median is 63.
   Values: **20, 24, 42, y, y + 2, 73, 75, 80, 99**
8. While checking the value of 20 observations, it was noted that 125 was wrongly noted as 25 while calculating the mean and then the mean was 60. Find the correct mean.
9. Construct the cumulative frequency distribution of the following distribution:

Class	Frequency
12.5 – 17.5	2
17.5 – 22.5	22
22.5 – 27.5	19
27.5 – 32.5	14
32.5 – 37.5	13

10. An aircraft has 120 passenger seats. The number of seats occupied during 100 flights are given in the following table:

Number of seats	100-104	104-108	108-112	112-116	116-200
Frequency	15	20	32	18	15

Answer Key

1. a) Centred at the class marks of the classes
2. d) Cumulative frequency
3. d) all the above
4. a) Mode = 3 Median – 2 Mean
5. c) Most frequent value
6. The first 10 natural numbers are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
   Mean = (1 + 2 +3 + 4 + 5 + 6 + 7 + 8 + 9 + 10) / 10 = 55/10 = 5.5
7. As the number of observations made is odd, so the median will be the middle term, i.e. y + 2.
   Therefore, y + 2 = 63 y = 63 – 2 = 61
8. Let y be the sum of observation of 19 (20 – 1) numbers leaving 125.
   So, y + 25 = 20 × 60 = 1200 {Mean = (sum of observations/ no. of observations)}
   As we know, x + 25 = 20 × 60 = 1200
   Also x + 125 = 20 × y = 20y
   Next, Subtract 125 − 25 = 20y – 1200 ⇒ 20y = 1300 ⇒ y = 65
9. The cumulative frequency distribution of the given distribution is given below:

Class	Frequency	Cumulative frequency
12.5 – 17.5	2	2
17.5 – 22.5	22	24
22.5 – 27.5	19	43
27.5 – 32.5	14	57
32.5 – 37.5	13	70

Class Interval	Class Marks (xi)	Frequency (fi)	Deviation (di = xi – a)	fidi
100 – 104	102	15	– 8	– 120
104 – 108	106	20	– 4	– 80
108 – 112	110	32	0	0
112 – 116	114	18	4	72
116 – 120	118	15	8	120
		N = Σfi = 100		**Σfidi = – 8**

10.
∴ Assumed mean, a = 110
Class width, h = 4
And total observations, N = 100 = 110 + (-8/100) = 110 – 0.08 = 109.92
But we know that the seats cannot be in decimal.
Therefore, the number of seats = 109 (approx.)

Learning Level Tracker

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Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Statistics		
		Level 1	Level 2	Level 3

Chapter 14 : Probability

Activity 1 Lucky Draw Raffle

35 mins

Instructions

- Start by announcing an exciting situation:
  "Today, we'll host a lucky draw to win... a homework-free pass!"
- Before class, prepare 10 folded chits – 6 with the word "Try Again" and 4 with "Winner" written on them. Put them in a box.
- Ask each student to come up, pick a chit, and show it. After each pick, replace the chit back to keep total outcomes unchanged.
- On the board, create a tally:
  - How many "Winners" vs "Try Again" were picked?
  - Ask students to calculate the theoretical probability of winning.
  - Guide students to calculate the theoretical probability of winning:
    Explain that the probability of an event is calculated as:
    Probability = (Number of favourable outcomes) / (Total number of outcomes)
    In this case, there are 4 "Winner" chits out of 10 total chits, so the theoretical probability is 4/10 or 0.4.
  - Compare this with the actual outcomes from the experiment.
- Continue the activity with engaging variations:
  - What happens if we do not replace the chits after each draw?
  - What if every student gets a unique chit with only one chance to pick?
- Wrap up by connecting to real-world examples:
- **"This is the logic behind lotteries, quiz bowl draws, and even getting selected for a scholarship!"**

Activity 2 Deck Detectives

35 mins

Instructions

- Begin the class by saying:
  "Imagine you're strategists in a board game championship. Your power? Logic and probability!"
- Prepare the materials before the class:
  - Use a set of marbles (12 total), with 3 marbles of each colour: red, blue, green, and yellow.
  - If the marbles are not already coloured, you can colour them before the class to make them clearly distinguishable. For example, paint 3 marbles red, 3 marbles blue, 3 marbles green, and 3 marbles yellow.
- Divide the class into small groups of 4-5 students:
  - **Group A:** One group will focus on calculating the probability of drawing a red or blue marble.

  - **Group B:** Another group will focus on calculating the probability of drawing a green or yellow marble.
  - **Group C:** The remaining group can focus on exploring probabilities involving "not" a certain colour.
- Explain the setup:
  - "You have 12 marbles in a jar, with 3 marbles of each colour: red, blue, green, and yellow."
  - Explain the total number of marbles and the number of each colour.
- Distribute a set of 5-6 question cards (written beforehand) randomly each group, such as:
  - "What's the probability of drawing a red marble?"
  - "What's the probability of drawing a blue marble?"
  - "What's the probability of drawing a green marble?"
  - "What's the probability of drawing a marble that is not green?"
  - "What's the probability of drawing a marble that's not yellow?"
- Let groups discuss and write answers:
  - Allow each group to discuss their questions and write down their answers. Ensure that students collaborate and explain their reasoning within their groups.
  - Once they are ready, call on each group to share their findings and explain why they chose their answers. Encourage them to walk through their calculations and logic.
- Add a "wild Entry round":
  - Secretly remove 1 or 2 marbles from the jar
  - Ask the students how this change affects the probability. Have them revise their calculations based on the new scenario (If marbles are removed, the total number of marbles decreases, which changes the probability. The probabilities for each colour will need to be recalculated based on the new number of marbels.)
- Wrap up with:

  "Card games are full of probability – from blackjack to poker. Even shuffling is a statistical wonder!"

Activity 3 The Colour Count

35 mins

Instructions

- Set the context with an engaging scenario and tell students:

  "If you could randomly grab one candy from this jar... what's your best bet for getting your favourite colour?"

  To make it more engaging, draw a simple picture of a jar on the board or use cut-outs of candies in different colours (e.g., red, blue, yellow, green). You can label the number of each colour or use coloured paper balls/cut-outs to represent the candies.
- Before class, prepare a jar of coloured beads/candies/paper balls: e.g., 5 red, 3 blue, 2 yellow, 4 green, and show the jar to the students, explaining that each candy represents a different colour.
- L et each student draw one candy (without looking) and record their result:
  - Each student will take turns drawing one candy from the jar (without looking), recording the colour they picked, and then returning the candy to the jar before the next student draws.
  - After each student draws, ask them to write down the colour they picked on the board.

- Track the colour tallies and calculate the probabilities:
    - On the board, track the number of times each colour is picked by tallying the results.
    - **Theoretical Probability:**
      Discuss how to calculate the theoretical probability of picking each colour. For example, the probability of picking a red candy is the number of red candies divided by the total number of candies.

      P(red) = Total number of candies/Number of red candies
    - **Experimental Probability:**
      Calculate the experimental probability by dividing the number of times a specific colour was picked by the total number of draws.
- Ask engaging questions to begin discussion:
    - "What if we remove the yellow candies entirely? How would that affect the probability?"
    - "What happens if we don't return the candy each time? How would this change the probabilities?"
- Wrap up the activity by telling:

  "Probability shows up in packaging, design, and even flavours – ever wonder why certain colours show up more often?"

Assessment

35 mins

Answer the following questions:

1. The probability of a sure Event is:
    a. 0
    b. 1/2
    c. 1
    d. Non-existent
2. If the probability of a player winning a game is 0. 79, then the probability of his losing the same game is:
    a. 1. 79
    b. 0. 31
    c. 0. 21%
    d. 0. 21
3. The probability that a non- leap year has 53 Sundays is:
    a. 1/7
    b. 2/7
    c. 5/7
    d. 6/7
4. A letter is selected at random from the letters of the words 'MATHEMATICS' then the probability of getting the letter M is:
    a. 2/11
    b. 6/11
    c. 4/11
    d. 5/11
5. A die is thrown once, then the probability of getting an even prime number is:
    a. 1/6
    b. 1/2
    c. 1/3
    d. 2/3
6. Find the distance of the point P (2, 3) from the x-axis.
7. A die is thrown once. What is the probability of getting a number less than 3?
8. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap?
9. 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether it is defective or not. One pen is taken out at random from this lot. Determine the probability that the pen is taken out is a good one.
10. A letter is chosen at random from the letters of the word "ASSASSINATION", then the probability that the letter chosen is a vowel is in the form of 6/ (2x+1), then x is equal to.

Answer Key

1. c) 1
2. d) 0. 21
3. a) 1/7
4. a) 2/11
5. a) 1/6
6. Given that a die is thrown once.
   Total number of outcomes = n(S) = 6 i.e. S = {1, 2, 3, 4, 5, 6}
   Let E be the event of getting a number less than 3.
   n(E) = Number of outcomes favourable to the event E = 2, Since E = {1, 2}
   Hence, the required probability = P(E) = n(E)/n(S) = 2/6 = 1/3

7. Let P (x, y) be equidistant from the points A (7, 1) and B (3, 5).
   Then, AP = BP $AP^2 = BP^2$
   Using the distance formula, $(x - 7)^2 + (y - 1)^2 = (x - 3)^2 + (y - 5)^2$
   $\Rightarrow x^2 - 14x + 49 + y^2 - 2y + 1 = x^2 - 6x + 9 + y^2 - 10y + 25$
   $\Rightarrow x - y = 2$
   Hence, the relation between x and y is x – y = 2.

8. Given, Total number of apples in the heap = n(S) = 900
   Let E be the event of selecting a rotten apple from the heap.
   Number of outcomes favourable to E = n(E)
   $P(E) = n(E)/n(S) \Rightarrow 0.18 = n(E)/900 \Rightarrow n(E) = 900 \times 0.18 \Rightarrow n(E) = 162$
   Therefore, the number of rotten apples in the heap = 162

9. Numbers of pens = Numbers of defective pens + Numbers of good pens
   $\therefore$ Total number of pens = 132 + 12 = 144 pens
   P(E) = (Number of favourable outcomes) / (Total number of outcomes)
   P(picking a good pen) = 132/144 = 11/12 = 0.916
   Given A letter is chosen at random from the letters of the word 'ASSASSINATION', then the probability that the letter chosen is a vowel and is in the form of 6/2 x+1 then x is equal to So the word ASSASSINATION comprises of 13 letters and 6 vowels.
   So out of these letters one letter can be chosen in 13 ways.
   So, we have number of events is 6 and number of outcomes is 13
   Also Probability is of the form 6 / 2x + 1
   So Probability P = Number of events / number of outcomes
   $\Rightarrow 6/(2x + 1) = 6 / 13$
   $\Rightarrow 1/2x + 1 = 1/13$
   $\Rightarrow 2x + 1 = 13$
   $\Rightarrow 2x = 13 - 1$
   $\Rightarrow 2x = 12 \Rightarrow x = 12 / 2 \Rightarrow x = 6$

Learning Level Tracker

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Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Probability		
		Level 1	Level 2	Level 3

Chapter 3: Pair of Linear Equations in two Variables

Activity 1 Act it Out – You Be the Equation!

35 mins

Instructions

- Start by saying:
  "You are not just students today—you are variables and equations!"
- Prepare a group of 4 students and designate their roles, for example:
  - One student is **x**
  - Another is **y**
  - Two others hold equation cards:
    → x + y = 10
    → x = 2y
- Ask them:
  - "If x = 2y, then what can you substitute in the first equation (x + y = 10)?"
  - Let the "x" student act it out:
    → Replaces himself with "2y" in the first equation.
  - Now solve together, calculate values, and assign them back to the students (e.g., y = 2, x = 4)
- Repeat with different sets of equations, rotating student roles.
- Wrap up the activity with:
  "Substitution is like putting one truth into another—making things simpler!"

Activity 2 Bus Route Riddle – Where Do They Meet?

35 mins

Instructions

- Start with a scenario to grab attention:
  ""There are two bus routes in our city. One starts from Point A and follows the route: *'y = 2x + 1'*, while the other starts from Point B and follows: *'y = -x + 7'*. Can you figure out where the buses will cross paths?""
- On the classroom board/floor/chart paper/graph paper draw the coordinate plane.
- Divide students into two teams:
  - One team will plot Bus Route A (using the equation y = 2x + 1 and different values of x and y, such as (0,1), (1,3), (2,5), etc.).
  - The other team will plot Bus Route B (using the equation y = -x + 7 and different values of x and y, such as (0,7), (1,6), (2,5), etc.).
- Once both lines are plotted, ask:

- Where do they intersect?
- What does the point of intersection mean in this context?

- Now extend the activity with:
  - Give a new pair of equations with **no solution** (parallel lines).
  - Or a pair that **coincides** (infinitely many solutions).
- Wrap up with a discussion:

  "Graphical solutions help us visualise the concept of solutions – where two conditions (or lines) meet, never meet, or overlap completely!"

Activity 3 Solve It Like a Detective

35 mins

Instructions

- Begin the class with telling students:

  "You're detectives trying to solve two clues at once. Both are true. But to find the criminal (values of x and y), we need to eliminate one suspect first!"
- Write a system of equations on the board:
  - $3x + 2y = 16$
  - $5x - 2y = 4$
- Ask the class:
  - "Looking at these two equations, what do you notice about the coefficients of y?" (In this case, the coefficients of y are +2 and -2. This is important because when you add or subtract these equations, the y terms can cancel each other out.)
  - "Can we add or subtract these equations to eliminate y? What do you think will happen if we add them?"
- Walk through the solution interactively on the board and try to solve the equation step by step:
  - The coefficients of y are opposites (+2 and -2), so we can **add** the equations to eliminate the y terms.
  - Now, let's add the left-hand sides and the right-hand sides:

    $(3x + 2y) + (5x-2y) = 16+4$; This simplifies to $8x = 20$, Thus $x = 2.5$
  - Once we have $x = 2.5$, substitute this value back into one of the original equations (for example, $3x+2y=163x + 2y = 163x+2y=16$) to solve for y.
- Hand out 3 more systems of equations to student pairs, divide them into pairs and give each pair a new system of equations to solve, proceed:
  - Form pairs with your classmates.
  - Each pair will receive a system of equations.
  - Some systems will require adding the equations, some will require subtracting them, and some will need multiplying one or both equations first to align the coefficients for elimination.
- Examples of systems:
  - Pair 1:

    $4x+3y=10$

    $2x-3y=42$

    (Here, you can add the equations because the coefficients of y are opposites.)
  - Pair 2:

    $3x-y=12$

    $5x+y=14$

(Here, you should add the equations because the coefficients of y are opposites.)

- Pair 3:

  6x+4y=18

  3x+2y=10

  (In this case, you might need to multiply one or both equations to make the coefficients of y the same before subtracting.)

- Invite pairs to share their solutions, as each pair solves their system, let them share:
  - What did you eliminate?
  - What method did you choose (addition, subtraction, or multiplication)? Why did you choose that method?
- Conclude the activity by talking about the method of elimination

"Like in real cases, elimination works when you cleverly cancel one part and focus on what remains."

Assessment

45 mins

Answer the following questions:

1. If the graphs of two lines pass through the same points, then the system of equations representing these lines is:
    a) consistent
    b) inconsistent
    c) consistent dependent
    d) inconsistent and dependent
2. The pair of equations x = a and y = b graphically represents lines which are:
    a) parallel
    b) intersecting at (b, a)
    c) coincident
    d) intersecting at (a, b)
3. Which of the following method(s) is/are used to find the solution of a pair of linear equations algebraically?
    a) Substitution Method
    b) Elimination Method
    c) Cross- multiplication Method
    d) All the above
4. If (6, k) is a solution of the equation 3x + y – 22 = 0 then the value of k is:
    a) 4
    b) 3
    c) -4
    d) -3
5. If the lines 3x+2ky – 2 = 0 and 2x+5y+1 = 0 are parallel, then what is the value of k?
    a) 4/15
    b) 15/4
    c) 4/5
    d) 5/4
2. Find the solution of the equations x - y = 2 and x + y = 4.
3. The angles of cyclic quadrilaterals ABCD are: A = (6x+10), B = (5x) °, C = (x + y) ° and D = (3y-10) °. Find the value of x and y.
4. The father's age is six times his son's age. Four years hence, the age of the father will be four times his son's age. Find the present ages, in years, of the son and the father.
5. The coach of a cricket team buys 7 bats and 6 balls for Rs.3800. Later, she buys 3 bats and 5 balls for Rs.1750. Find the cost of each bat and each ball.
6. Solve the following pairs of equations by reducing them to a pair of linear equations:
    1/2x + 1/3y = 2
    1/3x + 1/2y = 13/6

Answer Key

1. c) consistent dependent
2. d) intersecting at (a, b)
3. d) All the above
4. a) 4
5. b) 15/4
6. x-y =2 ⇒ x=2+y
   Substituting the value of x in the second equation we get ⇒ 2+y+y=4 ⇒ 2+2y=4
   2y = 2 ⇒ y=1
   Now putting the value of y, we get ⇒ x=2+1 = 3
   Hence, the solutions are x=3 and y=1.

7. We know, in cyclic quadrilaterals, the sum of the opposite angles is 180°.
   Hence, A + C = 180° ⇒ 6x+10+x+y=180 ⇒ 7x+y=170°
   And B+D=180° ⇒ 5x+3y-10=180 ⇒ 5x+3y=190°
   By solving the above two equations we get:
   x=20° and y = 30°.

8. Let x years be the present age of father and y years be the present age of son.
   According to the given,
   (x + 4) = 4(y + 4) ⇒ x + 4 = 4y + 16 ⇒ x- 4y + 4 – 16 = 0
   x – 4y – 12 = 0….(i)
   Also, x = 6y….(ii)
   From (i) and (ii),
   6y – 4y – 12 = 0 ⇒ 2y = 12 ⇒ y = 6
   Substituting y = 6 in (ii),
   x = 6(6) = 36

9. Let the cost of a bat be x and the cost of a ball be y.
   According to the question, 7x + 6y = 3800 ……. (i)
   3x + 5y = 1750 ……. (ii)
   From (i), we get:
   y = (3800 – 7x)/6 …… (iii)
   Substituting (iii) in (ii). we get,
   3x + 5[(3800 – 7x)/6] = 1750 ⇒ 3x + (9500/3) – (35x/6) = 1750 ⇒ 3x – (35x/6) = 1750 – (9500/3)
   (18x – 35x)/6 = (5250 – 9500)/3 ⇒-17x/6 = -4250/3 ⇒-17x = -8500 ⇒ x = 500
   Putting the value of x in (iii), we get:
   y = (3800 – 7 × 500)/6 = 300/6 = 50
   Hence, the cost of a bat is Rs 500, and the cost of a ball is Rs 50.

10. Given,

$1/2x + 1/3y = 2$

$1/3x + 1/2y = 13/6$

Let us assume $1/x = m$ and $1/y = n$, then the equations will change as follows.

$m/2 + n/3 = 2$

$\Rightarrow 3m+2n-12 = 0$….(1)

$m/3 + n/2 = 13/6$

$\Rightarrow 2m+3n-13 = 0$….(2)

Now, using cross-multiplication method, we get,

$m/ (-26-(-36)) = n/ (-24-(-39)) = 1/ (9-4)$

$\Rightarrow m/10 = n/15 = 1/5$

$\Rightarrow m/10 = 1/5$ and $n/15 = 1/5$

So, $m = 2$ and $n = 3$

$1/x = 2$ and $1/y = 3$

$\Rightarrow x = 1/2$ and $y = 1/3$

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Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Pair of Linear Equations in two Variables		
		Level 1	Level 2	Level 3

Chapter 4 : Quadratic Equations

Activity 1 Target Trouble – Hit the Right Value!

35 mins

Instructions

- Begin with a scenario,

  "Imagine you're in a game where the score depends on where your ball lands. The scoring pattern follows a formula: *Score = $x^2 + 5x + 6$*. If your score is 0, can you tell me where the ball must've landed?"
- Write the expression on the board:

  → Score= $x^2 + 5x + 6$
- Ask students to test values mentally or with calculators (or pre-made answer cards) to see what makes the Score zero.
- Once they guess the correct values **(x = -2 and x = -3)**, discuss:
  - What is common between the two?
  - Why do these values work?
- Now convert expressions to equation form:
  - Turn expressions like $x^2 + 7x + 10$ into equations like $x^2 + 7x + 10 = 0$ and solve them **by factorisation method** (splitting the middle term).
- Wrap up the activity by highlighting

  "Any time we deal with a square term and we're solving for a value – we're likely in the world of quadratic equations!"

Activity 2 Area Arguments (using Factorisation method)

35 mins

Instructions

- Introduce the class with a relatable problem:

  "A rectangular garden has an area of 77 m^2. Its length is 4 metres more than its width. Can you figure out its dimensions?"
- Guide the students through setting up the problem:
  - Let's break this down together. We know the width of the garden is unknown, so let's call it **'x'**. The length of the garden is 4 meters more than the width, so we can say the length is **'x + 4'**. The area of the garden is 77 m^2, and we know the area of a rectangle is calculated by multiplying its length and width. So, we'll write the equation as: **x(x + 4) = 77**.

    → Now, let's expand this and form the equation: $x^2 + 4x - 77 = 0$
- Work together to solve the equation using factorisation formula.
- Test the roots in real-world context (only positive values make sense).

- Create more such problems involving **squares, rooms, plots**, etc. and give them to groups.
- Wrap up the activity by telling:
  "Quadratic equations help us find hidden dimensions in everyday structures—geometry meets algebra!"

Activity 3 Rocket Launch – Time to Hit the Ground (using Quadratic formula)

35 mins

Instructions

- Give students a situation:
  "A rocket is launched, and its height in metres after t seconds is given by
  $h = -5t^2 + 20t + 15$.
  When will it hit the ground?"
- Frame it by relating it with physics:
  - At ground level, height = 0
    → $-5t^2 + 20t + 15 = 0$
- Multiply both sides of the equation by -1 to simplify:
  - The equation **$-5t^2 + 20t + 15 = 0$** becomes **$5t^2 - 20t - 15 = 0$** after multiplying both the left-hand side (LHS) and right-hand side (RHS) by -1.
  - Now, solve the equation using the quadratic formula:
    $t = [-b \pm \sqrt{(b^2 - 4ac)}] / 2a$
- Calculate step-by-step with students and interpret the roots:
  - One root will be negative (ignore it)
  - Positive root is time when it lands
- Relate this activity by telling:
  "This is how physicists predict how long something takes to rise or fall—quadratic equations are all around us!"

Assessment

45 mins

1. Which of the following is a quadratic equation?
   a) $x^2 - 2x = (-2)(3 - x)$
   b) $x^2 + 3\sqrt{x} + 2 = 5$
   c) $(x - 2)(x + 1) = (x - 1)(x + 3)$
   d) $(x + 2)^3 = 2x(x^2 - 1)$
2. If $x = 3$ is a solution of the quadratic equation $3x^2 + (k - 1)x + 9 = 0$, then k equals to:
   a) 11
   b) -11
   c) 13
   d) -13
3. The roots of the equation $ax^2 + bx + c = 0$ are non-real if:
   a) $b^2 - 4ac = 0$
   b) $b^2 - 4ac > 0$
   c) $b^2 - 4ac < 0$
   d) $b = 0$
4. If ½ is a root of the quadratic equation $x^2 - kx + 6 = 0$ then the value of k is:
   a) 25
   b) -25
   c) 25/2
   d) 25/4
5. The Discriminant of the quadratic equation $x^2 + 8x + 16 = 0$ is:
   a) 3
   b) 2
   c) 1
   d) 0
2. The sum of two numbers is 27 and product is 182. Find the numbers.
3. The sum of areas of two squares is 468m^2. If the difference of their perimeters is 24cm, find the sides of the two squares.
4. Solve the quadratic equation $2x^2 - 7x + 3 = 0$ by using quadratic formula.
5. In a flight of 600 km, an aircraft was slowed due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. Find the original duration of the flight.
6. Is it possible to design a rectangular park of perimeter 80 and area 400 m^2.? If so, find its length and breadth.

Answer Key

1. a) $x^2 - 2x = (-2)(3 - x)$
2. b) -11
3. c) $b^2 - 4ac < 0$
4. c) 25/2
5. d) 0
6. Let x is one number

   Another number = $27 - x$

   Product of two numbers = 182

$\Rightarrow x(27 - x) = 182 \Rightarrow x^2 - 27x - 182 = 0 \Rightarrow x^2 - 13x - 14x + 182 = 0 \Rightarrow x(x - 13) - 14(x - 13) = 0 \Rightarrow (x - 13)(x - 14) = 0 \Rightarrow x = 13$ or $x = 14$

7. Let, the side of the larger square be x.
   Let, the side of the smaller square be y.
   Condition 1 $\Rightarrow x^2 + y^2 = 468$
   Condition 2 $\Rightarrow 4x - 4y = 24 \Rightarrow x = 6 + y \Rightarrow x^2 + y^2 = 468 \Rightarrow (6 + y)^2 + y^2 = 468$
   on solving we get $y = 12 \Rightarrow x = (12+6) = 18$ m
   $\therefore$ The length of the sides of the two squares are 18m and 12m.

8. Given $2x^2 - 7x + 3 = 0$
   On comparing the given equation with $ax^2 + bx + c = 0$, we get, $a = 2$, $b = -7$ and $c = 3$
   By using quadratic formula, we get, $x = [-b \pm \sqrt{(b^2 - 4ac)}]/2a \Rightarrow x = [7 \pm \sqrt{(49 - 24)}]/4$
   $\Rightarrow x = [7 \pm \sqrt{25}]/4 \Rightarrow x = [7 \pm 5]/4$
   Therefore, $\Rightarrow x = 7+5/4$ or $x = 7-5/4 \Rightarrow x = 12/4$ or $2/4$
   $\therefore x = 3$ or ½

9. Let the duration of the flight be x hours.
   According to the given, $(600/x) - [600/(x + 1/2) = 200$
   $\Rightarrow (600/x) - [1200/(2x + 1)] = 200$
   $\Rightarrow [600(2x + 1) - 1200x]/ [x(2x + 1)] = 200$
   $\Rightarrow (1200x + 600 - 1200x)/ [x(2x + 1)] = 200$
   $\Rightarrow 600 = 200x(2x + 1) \Rightarrow x(2x + 1) = 3$
   $\Rightarrow 2x^2 + x - 3 = 0 \Rightarrow 2x^2 + 3x - 2x - 3 = 0$
   $\Rightarrow x(2x + 3) - 1(2x + 3) = 0 \Rightarrow (2x + 3)(x - 1) = 0 \Rightarrow 2x + 3 = 0, x - 1 = 0$
   $\Rightarrow x = -3/2, x = 1$ (Time cannot be negative)
   Therefore, $x = 1$
   Hence, the original duration of the flight is 1 hr

10. Let the length and breadth of the park be L and B.
    Perimeter of the rectangular park = $2(L + B) = 80$
    So, $L + B = 40$ Or, $B = 40 - L$
    Area of the rectangular park = $L \times B = L(40 - L) \Rightarrow 40L - L^2 = 400 \Rightarrow L^2 - 40L + 400 = 0$, which is a quadratic equation.
    Comparing the equation with $ax^2 + bx + c = 0$, we get $a = 1$, $b = -40$, $c = 400$
    Since, Discriminant = $b^2 - 4ac \Rightarrow (-40)^2 - 4 \times 400 \Rightarrow 1600 - 1600 = 0$
    Thus, $b^2 - 4ac = 0$
    Therefore, this equation has equal real roots.
    Hence, the situation is possible.
    Root of the equation, $L = -b/2a$ $L = (40)/2(1) = 40/2 = 20$
    Therefore, length of rectangular park, L = 20 m
    And breadth of the park, $B = 40 - L = 40 - 20 = 20$ m.

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Name of the School:	**UDISE:**
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Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Quadratic Equations		
		Level 1	Level 2	Level 3

Chapter 5 : Arithmetic Progressions

Activity 1 Race of Numbers

35 mins

Instructions

- Lay down 10 number cards (or write numbers) on the classroom floor, maintaining a pattern with a common difference between the numbers:
    - Example: 5, 8, 11, 14, ..., up to the 10th term
- Assign each student a number and have them **stand** at their value.
- Tell them:
    - "Each of you is a runner. You all started at different points, but you're all running at the same speed – 3 steps ahead each time. What's happening here?"
- Ask them:
    - "Who started the earliest?"
    - "Can we predict where the 15th runner would be?"
    - Let students compute and check using $a + (n - 1) \times d$
- Repeat with a different AP where values decrease.
- Wrap up the activity by stating:

"Arithmetic progressions are like steady runners—fixed speed, consistent changes. You just need the first point and step size to predict anything!"

Activity 2 Seats in the Theatre

35 mins

Instructions

- Begin with a real scenario:

  "You've gone to watch a play. The front row has 10 seats, the next has 12, and the third has 14. If this continues, how many seats are there in the 15th row?"
- Ask students to identify:
    - First term ($a = 10$)
    - Common difference ($d = 2$)
- Guide them to find the number of seats in the 15th row → $a + (n - 1) \times d$
    - where a = first term, d = common difference, and n = row number.
- Now extend the activity to connect with other concepts:
    - "Can you find the total number of seats in 15 rows?"
    - Use sum formula: $S_n = n/2 \times [2a + (n - 1) \times d]$
- Give each group a different row pattern:

- E.g., starts from 5 seats and increases by 3 per row: 8 seats decreasing by 1, etc.

- Wrap up the activity by telling:

  "Theatre seating, staircases, or patterns in flooring—all often follow arithmetic progressions! Spot them in your world."

Activity 3 Fill in the Gaps

35 mins

Instructions

- Ask the students in the class:

  "Here's a puzzle: I have a series, but some numbers got smudged! Can you fill them in?"

- Write examples like:
  - __, 7, __, 13, __
  - 5, __, __, 17, __, 23
- Encourage students to:
  - Guess the common difference
  - Use the difference to fill in missing terms
- Give 3–4 examples to groups with varying difficulty levels (some easy, some with bigger gaps or negative differences), set conditions like solving within a time limit, and have them explain their logic after solving:
  - Easy:
    __, 7, __, 13, __ (Common difference: 3)
  - Medium:
    5, __, __, 17, __, 23 (Common difference: 3)
  - Tricky (larger gaps):
    __, 12, __, __, 24, __, 30 (Common difference: 6)
  - Challenging (negative difference):
    50, __, 40, __, __, 25 (Common difference: –5)
  - Bonus (mixed missing terms, needs extra attention):
    __, __, 15, 20, __, 30 (Common difference: 5)
- Make a game: fastest team to restore 3 sequences correctly wins.
- Wrap up the activity by saying that:

  "Understanding the pattern allows us to restore or predict any term. This works with dates, salaries, payments and more!"

Assessment

60 mins

1. If common difference of an AP is 5, then $a_{16} - a_{15}$ is:
   a) 1
   b) 31
   c) 5
   d) 15
2. The missing term in the box of the AP: 2, □, 26,……. Is:
   a) 6
   b) 14
   c) 12
   d) 13
3. If 5n + 3 is the n^{th} term of an AP, then the common difference is:
   a) 15
   b) 12
   c) 5
   d) 1
4. If a = - 2, d = 5 then the value of t_{10} is equal to:
   a) 23
   b) 33
   c) 43
   d) 53
5. The sum of first n natural numbers is:
   a) n (n + 1)/2
   b) n (n + 1)
   c) $n^2 + n$
   d) n^3
2. Find the 21st term of AP whose first two terms are -3 and 4?
3. In an Arithmetic Progression, if a = 28, d = -4, n = 7, then a_n is?
4. Find the sum of all three-digit numbers which leave remainder 3 when divided by 5.
5. Mona saved Rs 5 in the first week of a year and then increased her weekly saving by Rs 1.75. If in the nth week, her weekly savings become Rs 20.75, find n.
6. The houses of a row are numbered consecutively from 1 to 49. Show that there is a value of x such that the sum of the numbers of the houses preceding the house numbered x is equal to the sum of the numbers of the houses following it. Find this value of x. [Hint: $S_{x-1} = S49 - S_x$]

Answer Key

1. c) 5
2. b) 14
3. c) 5
4. c) 43
5. a) n (n + 1)/2
6. First term = -3 and second term = 4
   a = -3 and d = 4-a = 4-(-3) = 7
   $\therefore a_{21} = a + (21 - 1)\, d \Rightarrow -3 + (20)\, 7 \Rightarrow -3 + 140 \Rightarrow 137$

7. For an AP,
   $a_n = a + (n- 1)\, d$
   $\Rightarrow 28 + (7 - 1)\, (-4) \Rightarrow 28 + 6(-4) \Rightarrow 28 - 24 \Rightarrow a_n = 4$

8. Three-digit numbers which leave remainder 3 when divided by 5 are 103, 108, ..., 998
   To find n , $a_n = a + (n-1)d \Rightarrow 998 = 103 + 5(n - 1)$
   $\therefore n = 180$
   To find sum use the formula, $S_n = n/2[2a+(n-1)d]$
   $\Rightarrow S_{180} = 180/2[2(103) + 5(180 - 1)]$
   $\therefore S_{180} = 99090$

9. Given that, Mona saved Rs.5 in the first week and then started increasing her savings each week by Rs.1.75
   Hence, first term, a = 5 and common difference, d = 1.75
   Also given, $a_n = 20.75$
   Find, n =?
   As we know, by the n^{th} term formula, $a_n = a + (n - 1)\, d$
   Therefore, $20.75 = 5 + (n - 1) \times 1.75 \Rightarrow 15.75 = (n - 1) \times 1.75 \Rightarrow (n - 1) = 15.75/1.75 = 1575/175 = 63/7 = 9 \Rightarrow n = 10$
   Hence, n is 10.

10. Given
    Row houses are numbers from 1, 2, 3, 4, 5…….49.
    Thus, we can see the houses numbered in a row are in the form of AP.
    So, First term, a = 1 Common difference, d = 1
    Let' represent the number of the house as;
    Sum of preceding the numbers of x = sum of following numbers of x
    i.e. Sum of (1, 2, 3,….x – 1) = sum of [(x + 1), (x + 2) ,….48, 49]
    That is $1 + 2 + 3 + \ldots\ldots + (x - 1) = (x + 1) + (x + 2) \ldots\ldots + 49$
    $\Rightarrow [(x - 1)/2]\, [1 + x - 1] = [(49 - x)/2]\, [x + 1 + 49]$
    $\Rightarrow (x - 1)x = (49 - x)(x + 50)$
    $\Rightarrow x^2 - x = 49x + 2450 - x^2 - 50x$
    $\Rightarrow x^2 - x = 2450 - x^2 - x$
    $\Rightarrow 2x^2 = 2450$
    $\Rightarrow x^2 = 1225$
    $\Rightarrow x = \sqrt{1225}$
    $\Rightarrow x = 35$
    Therefore, the value of x is 35.

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Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Arithmetic Progressions		
		Level 1	Level 2	Level 3

Chapter 9 : Some Applications of Trigonometry

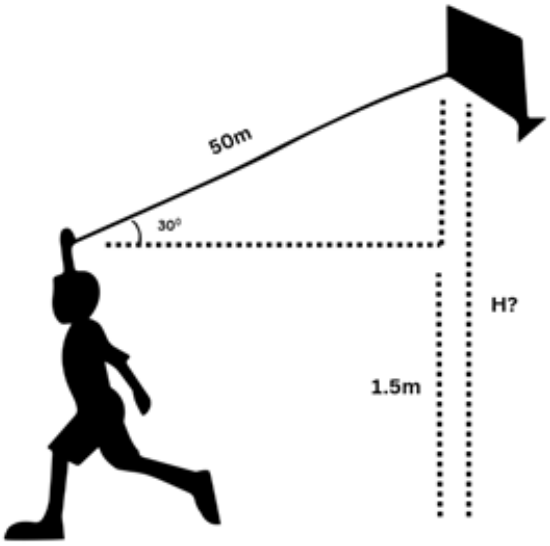
Activity 1 The Kite Festival Mystery

35 mins

Instructions

- Begin with a relatable story:

  "During the kite festival, Ria's kite is flying high. She's holding the string 1.5 metres above the ground. The string is taut and makes an angle of 30° with the ground. Can we find how high the kite is from the ground?"
- Prepare a scaled diagram on the board or projector to visualise this.



- Ask students to label:
  - **Draw a diagram based on the situation mentioned in the story.** This diagram should represent a right-angled triangle formed by the kite, the point on the ground directly below it, and Ria's hand holding the string.
  - Label the **Height of the kite (to be found)**. This will be the perpendicular side of your right triangle (from the level of Ria's hand to the kite).
  - Label the **Angle of elevation = 30°**. This is the angle between the ground (or horizontal line from Ria's hand) and the kite string.
  - Label the **Length of string = say 50 m (hypotenuse)**. This is the longest side of your right triangle, opposite the right angle.
- Guide them to form the right triangle and use:
  - $\sin(\theta) = \frac{\text{perpendicular}}{\text{hypotenuse}}$

    This trigonometric ratio (sine) is crucial here because it directly connects the information we know (the angle of elevation and the length of the string, which is the hypotenuse) with the information we want to find (the height of the kite, which is the perpendicular side). Without this specific relationship, we wouldn't be able to calculate the unknown height using the given angle and string length. It provides the mathematical link between the angle and the sides of the right triangle.

- Ask the students as a bonus challenge, "If the angle becomes 45° and the string length remains the same, how high will the kite be now?"
- Wrap up the activity by telling the real world use as

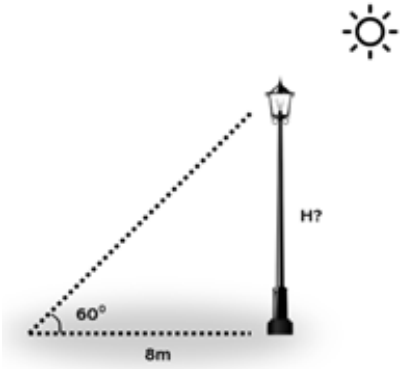
  "Angle of elevation helps us find unknown heights where climbing isn't possible thus used in aviation, construction, and more."

Activity 2 The Lamp Post Puzzle

35 mins

Instructions

- Start the activity by setting a scene: "A lamp post casts a shadow of 8 metres when the angle of elevation of the Sun is 60°. Can we find the height of the lamp post?"
- Ask the students to imagine or sketch the triangle formed:
  - Shadow = base = 8 m
  - Angle of elevation = 60°
  - Use: tan(θ) = height / base



- Solve together:
  - height = base × tan(θ) = 8 × √3 ≈ 13.86 m
  - In a right-angled triangle, the **tangent (tan)** of an angle is defined as the ratio of the length of the **opposite side** (the height of the lamp post) to the length of the **adjacent side** (the shadow). So, tan(angle) = height / base.
  - By rearranging this formula to height = base × tan(angle), we can directly calculate the lamp post's height using the values we've measured. It's like having a formula that tells us exactly how to get the answer we need from the pieces of information we have; already did in the first point.
- Bonus Challenge: Now change the angle to 30°, 45°, 75° and let students calculate the height for the same or different shadow lengths.
- Form groups of 4-5 students and give each a different scenario. Once solved, groups explain the steps they followed.
- Conclude the activity with:

  "This formula/technique allows engineers and surveyors to find heights of tall structures without ever having to climb them or use long measuring tapes, simply by measuring their shadows and the Sun's angle.!"

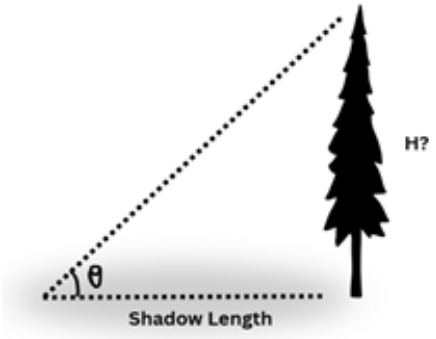
Activity 3 Measuring the Ancient Giants of Mawphlang

35 mins

Instructions

- Start the activity with a scenario: “As **Local Architects** in Mawphlang, you need to measure the height of a giant, ancient tree without climbing it. Using an angle-measuring device and a tape, you observe its shadow and the angle of elevation. Can you use trigonometry to find its height?”

  You are **Local Architects/Conservation Surveyors**, using trigonometry for indirect measurements.
- Divide the class into 4–5 "Surveyor Teams."
- Before the activity:
  - **Prepare a Large Diagram:** Draw a clear diagram on the board/projector showing a vertical tree, its shadow, and the angle of elevation, forming a right-angled triangle. Label height 'h', shadow 'base', and the angle.
  - **Prepare "Survey Data Cards":** For each team, provide a card with a shadow length and an angle of elevation (e.g., "Shadow: 15 meters, Angle: 60°. Calculate tree height."). Use standard angles (30°, 45°, 60°).
  - **Provide Tools:** Teams need **paper, pencils, rulers, and scientific calculators.** (Optional: trigonometric table/quick reference for tan values).



- Briefly explain how trigonometry helps measure inaccessible heights. Recall tan, sin, cos ratios.
- Guide students to sketch the right-angled triangle, identifying the unknown tree height (opposite), the known shadow length (adjacent), and the known angle of elevation.
- Ask "Which ratio connects the opposite and adjacent sides?" Guide them to use $\tan(\theta) = \frac{\text{Opposite}}{\text{Adjacent}}$.
- Help teams set up the equation (e.g., $\tan(60°) = \frac{h}{15}$) and solve for 'h'.
- Teams solve their specific "Survey Data Card" scenario, then present their calculated tree height and method.
- Bonus Challenge:
  - "After finding the tree's height, calculate the length of the line of sight from your observation point to the treetop (hypotenuse)."
  - "If the observer's eye is 1.5m above ground, how does that change the calculation?"
- Wrap up the activity with discussion:
  - "How did trigonometry help measure the tree indirectly?"
  - "Where else are these applications used (e.g., construction, forestry)?"

Assessment

60 mins

Answer the following questions:

1. If the length of the shadow of a tree is decreasing, then the angle of elevation is:
   a) Increasing
   b) Decreasing
   c) Remains the same
   d) None of the above
2. The angle formed by the line of sight with the horizontal when the point is below the horizontal level is called:
   a) Angle of elevation
   b) Angle None of the above
   c) No such angle is formed
   d) None of the above
3. The line drawn from the eye of an observer to the point in the object viewed by the observer is said to be:
   a) Angle of elevation
   b) Angle of depression
   c) Line of sight
   d) all the above
4. The height or length of an object or the distance between two distant objects can be determined with the help of:
   a) Trigonometry angles
   b) Trigonometry ratios
   c) Trigonometry identities
   d) None
5. The angle formed by the line of sight with the horizontal when the point being viewed is above the horizontal level is called:
   a) Angle of elevation
   b) Angle of depression
   c) No such angle is formed
   d) None of the above
6. From a point on the ground, which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60°. The height of the tower (in m) standing straight is?
7. If the angles of elevation of the top of a tower from two points at the distance of a m and b m from the base of tower and in the same straight line with it are complementary, then find the height of the tower (in m)?
8. The angle of elevation of the top of a building from a point on the ground, which is 30 m away from the foot of the building, is 30°. Find the height of the building?
9. The ratio of the height of a tower and the length of its shadow on the ground is $\sqrt{3}$: 1. Find the angle of elevation of the Sun?
10. The angle of elevation of the top of a tower is 30°. If the height of the tower is doubled, then the angle of elevation of its top will become?

Answer Key

1. Increasing
2. Angle of depression
3. Line of sight
4. Trigonometry ratios
5. Angle of elevation
6. We know that $\Rightarrow \tan(\text{angle of elevation}) = \frac{\text{height of tower}}{\text{its distance from the point}}$

   $\tan 60° = \frac{h}{15} \Rightarrow \sqrt{3} = \frac{h}{15} \Rightarrow h = 15\sqrt{3}$
7. If the angles of elevation of the top of a tower from two points at the distance of a m and b m from the base of tower and in the same straight line with it are complementary, then the height of the tower (in m) is $\sqrt{ab}$.
8. Say x is the height of the building.

   a is a point 30 m away from the foot of the building.

   Here, height is the perpendicular and distance between point a and foot of building is the base.

   The angle of elevation formed is 30°.

   Hence, $\tan 30° = \frac{\text{perpendicular}}{\text{base}} = \frac{x}{30} \Rightarrow \frac{1}{\sqrt{3}} = \frac{x}{30} \Rightarrow x = \frac{30}{\sqrt{3}}$
9. Let AB be the height and BC be its shadow.

   θ be the angle of elevation of the Sun.

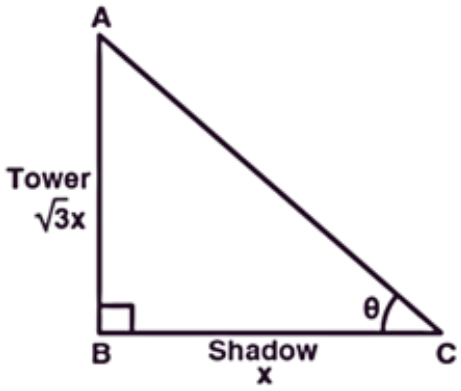
   According to the given, AB : BC = $\sqrt{3}$: 1

   So, AB = √3x and BC = x

   In right triangle ABC,

   $\tan\theta = \frac{AB}{BC} \Rightarrow \tan\theta = \frac{\sqrt{3}}{x}$

   $\Rightarrow \tan\theta = \sqrt{3} \Rightarrow \tan\theta = \tan 60° \Rightarrow \theta = 60°$



10. Let AB = h be the height and BC = x.

    In this case, the angle of elevation is 30°.

    When height is doubled, the height of the tower will be PQ = 2h.

    In this case, consider the angle of elevation as θ.

    Also, BC = QR = x.

    In triangle ABC,

    $\tan 30° = \frac{AB}{BC} = \frac{h}{x}$

    $\frac{1}{\sqrt{3}} = \frac{h}{x}$....(i)

    In triangle PQR,

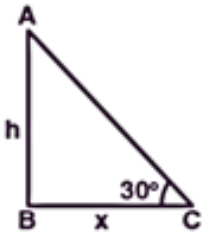
    $\tan\theta = \frac{PQ}{QR}$

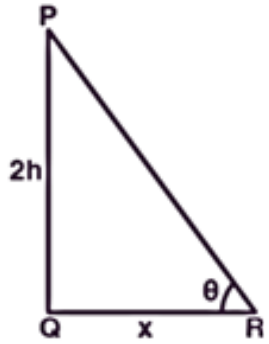
    $\tan\theta = \frac{2h}{X}$

    $\tan\theta = 2(\frac{1}{\sqrt{3}})$ {from (i)}

    $\tan\theta = 1.15$ (approximate)

    $\theta = \tan^{-1}(1.15) < 60°$.





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Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Some Applications of Trigonometry		
		Level 1	Level 2	Level 3

Chapter 10 : Circles

Activity 1 The Wheel of Wonders

35 mins

Instructions

- Start by announcing an exciting situation:

  "In a skilled Khasi weaving village, artisans use a traditional spinning wheel (like a *Charkha*) to prepare fine threads from cotton or eri silk. As the large spinning wheel turns, the thread unwinds smoothly, always leaving the wheel in a perfectly straight line from its very edge. For the thread to be wound evenly and without snagging, the path it takes as it leaves the wheel must be precise. Can we discover the secret mathematical rule that ensures the thread always leaves the spinning wheel perfectly straight and aligned?"
- On the board, draw a large circle representing the spinning wheel. Mark a radius from the centre of the circle to a point on its circumference. Then, draw a straight line that touches the circle exactly at the endpoint of that radius, extending outwards.
- Explain this line (representing the unwinding thread) is called a tangent. Guide students to observe the relationship between this tangent line and the radius at the point where the thread touches the wheel. Help them see that this line appears to form a right angle with the radius at that precise point of contact.
- Ask students to come up and use a large protractor or set square to physically verify the 90° angle on the chart paper diagram or a circular model prepared beforehand.
- Let pairs of students draw different radii and tangents on their notebooks (or on mini whiteboards). Guide them to carefully draw a straight line that touches their circle at the end of each radius. Then, have them confirm with their protractors that the tangents are indeed perpendicular (form a 90° angle) to the radius at the point of contact.
- Wrap up the activity as: "This fundamental property of tangents – that they are always perpendicular to the radius at the point of contact – is not just a weaver's secret! It's a vital principle used in designing bicycle wheels, conveyor belts, roundabouts, and even in robotics. Knowing exactly where a straight line 'touches' a curved path helps engineers control direction, pressure, and movement in various mechanical and natural systems!"

Activity 2 The Thread and Pin Experiment

35 mins

Instructions

- Start the class with a guiding question/recall:

  "We know a straight line that touches a circle at exactly one point is called a **tangent**. But what happens when we consider drawing tangents from a point *outside* the circle? How many such unique straight lines can we draw from one external point that just 'kiss' the circle?"
- Before the class prepare the materials:
  - Provide each group with a small circular cut-out (like a bottle cap or a drawn circle).
  - Provide a thread for each group.
  - Provide a pin or a sketch pen to act as the external fixed point.
- Step 1: Identifying the External Point: Ask students to fix the pin (or hold the sketch pen firmly) on a piece of paper, ensuring it is at a point outside their circular cut-out. This pin/pen represents the 'external point'.
- Step 2: Drawing the First Tangent (Hands-on Exploration): Now, ask students to carefully take the thread, hold one end at the fixed pin, and pull it taut so that it just touches the circular cut-out at exactly one point.
  - *Observe*: Guide them to see that the thread forms a straight line that is a tangent to the circle. They should trace this line with a pencil.
- Step 3: Drawing the Second Tangent (Discovery): Without moving the fixed pin, challenge the students to try and make the thread touch the circle at a different single point while still keeping the thread straight and taut from the fixed pin.
  - *Observe*: They should discover that they can indeed touch the circle at one *other* distinct point. Ask them to trace this second line.
  - Guide them to realise: From one point outside a circle, exactly two tangents can be drawn.
- Step 4: Tangent from a Point ON the Circle: Now, ask them to imagine (or try if possible) fixing the pin on the edge of the circle. Challenge them to draw a straight, taut line (tangent) from this point that touches the circle at only one place.
  - Guide them to realise: From a point *on* the circle, only **one tangent** can be drawn.
- Step 5: Measuring Tangent Lengths (Verification): Invite groups to carefully measure the lengths of the two tangents they drew from the original external point (from the pin to the point of contact on the circle). Observe: Guide them to notice and confirm that both tangents from the external point are equal in length.
- Wrap up with: "This principle – about how many tangents can be drawn from a point and that their lengths from an external point are equal – is crucial in practical design! It's used in designing roads and flyovers where precise contact with circular paths is needed, in setting up circular tracks, and even in various mechanical linkages where smooth, single-point contact is vital!"

Activity 3 The Mirror Reflection

35 mins

Instructions

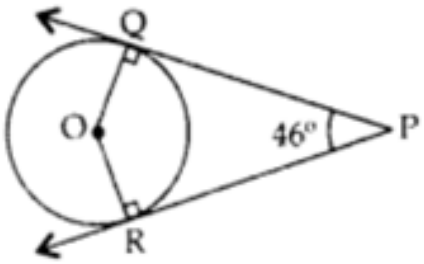
- Begin the class by setting up the scene: “Imagine you’re standing in front of a round mirror and drawing two lines from where you're standing to just touch the mirror on both sides. What do you notice?”
- On the board, draw a circle and mark an external point. From this point, draw two tangents to the circle. Ask: “How can we prove these two lines are of equal length?”
- Use geometry tools to measure the two lengths—students will see both are equal.
- Let students draw this in their notebooks. Encourage them to use rulers and compasses to:
  - Mark an external point.
  - Construct two tangents.
  - Measure and verify the lengths.
- Challenge the groups and ask them to try this with points at different distances from the circle and see if the property holds.
- Wrap up the activity by telling: “This is used in designing circular fountains, lighting systems, and sports fields, where symmetry and equal reach matter!”

Assessment

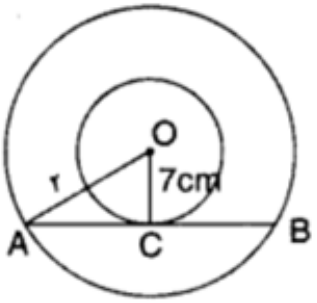
60 mins

Answer the following questions:

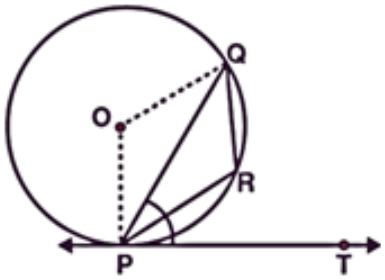
1. A circle has a number of tangents equal to:
   a) 0
   b) 1
   c) 2
   d) infinite
2. A tangent intersects the circle at:
   a) One point
   b) Two distinct point
   c) At the circle
   d) None of the above
3. If a parallelogram circumscribes a circle, then it is a:
   a) Square
   b) Rectangle
   c) Rhombus
   d) None
4. A line intersecting a circle in two points is called a _____.
   a) Secant
   b) Chord
   c) Diameter
   d) Tangent
5. The tangent to a circle is _____ to the radius through the point of contact.
   a) parallel
   b) perpendicular
   c) perpendicular bisector
   d) bisector
6. If the angle between two radii of a circle is 130°, the angle between the tangents at the ends of the radii is?
7. In the given figure, PQ and PR are two tangents to a circle with Centre O. If ∠QPR = 46°, then calculate ∠QOR.



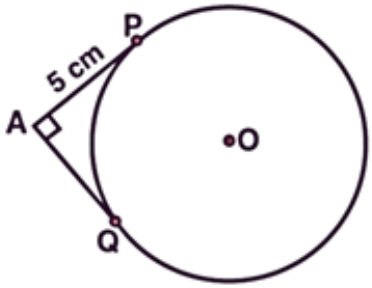
8. Two concentric circles are of radii 7 cm and r cm respectively, where r > 7. A chord of the larger circle, of length 48 cm, touches the smaller circle. Find the value of r.



9. In the figure below, PQ is a chord of a circle and PT is the tangent at P such that ∠QPT = 60°. Then ∠PRQ is equal to?



10. In the figure below, the pair of tangents AP and AQ drawn from an external point A to a circle with centre O are perpendicular to each other and length of each tangent is 5 cm. Then the radius of the circle is?



Answer Key

1. Infinite
2. One point
3. Rhombus
4. Secant
5. perpendicular
6. We know that the sum of the angle between two radii of a circle and the angle between the tangents at the ends of the radii is 180°.

   Therefore, the angle between the tangents at the ends of the radii = 180° – 130° = 50°
7. ∠OQP = 900 ∠ORP = 90° ∠OQP + ∠QPR + ∠ORP + ∠QOR = 360° …[Angle sum property of a quad.]

   ⇒ 90° + 46° + 90° + ∠QOR = 360° ∠QOR = 360° – 90° – 46° – 90° = 134°
8. OC = 7 cm, AB = 48 cm

   To find: r = ?

   ∠OCA = 90° ..[Tangent is ⊥ to the radius through the point of contact]

   ∴ OC ⊥ AB ⇒ AC = 1/2 (AB) … [⊥ from the centre bisects the chord]

   ⇒ AC = $\frac{1}{2}$ (48) = 24 cm

   In rt. ΔOCA, $OA^2 = OC^2 + AC^2$ … [Pythagoras' theorem]

   $r^2 = (7)^2 + (24)^2 = 49 + 576 = 625$

   ∴ r= √625 = 25 cm
9. From the given figure,

   ∠QPT = 60°

   ∠OPT = 90°

   Thus, ∠OPQ = ∠OQP = 30°, i.e., ∠POQ = 120°.

   Also, ∠PRQ = ($\frac{1}{2}$) reflex ∠POQ

   reflex ∠POQ = 360° – 120° = 240°

   Therefore, ∠PRQ = ($\frac{1}{2}$) × 240° = 120°
10. Join OP and OQ.

    Tangents AP = AQ

    In triangle APO and AQO,

    AP = AQ

    AO = AO (Common)

    OP = OQ (radius of same circle)

    Thus, ΔAPO ~ ΔAQO.

    POQA is a square

    OP = OQ = AP = AQ

    So, AP = AQ = 5 Cm

    And AP = OP (Proved)

    Therefore, radius = OP = 5 cm

Learning Level Tracker

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Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Circles		
		Level 1	Level 2	Level 3

Chapter 12 : Surface Areas and Volumes

Activity 1 The Painted Toolbox

35 mins

Instructions

- Introduce the class with a real-world situation: "You're asked to paint a cylindrical water tank and a cuboidal toolbox. You're given a budget for paint. How much surface will you need to cover, and how much paint will you need?"
- Divide students into groups and assign them mock dimensions for:
  - A cylinder (say, radius = 2 m, height = 5 m)
  - A cuboid (say, 3 m × 2 m × 2 m)
- Ask them to calculate:
  - Curved surface area (CSA) and total surface area (TSA) for both shapes.
  - Compare which one requires more paint and why.
- Now switch dimensions—give a cylinder with a large radius and small height, and vice versa for the cuboid.
- Let groups discuss: "Which part increases the surface area most—height, radius, or both?"
- Wrap up the activity with: "Surface area helps us determine how much material is needed for packaging, painting, insulation, and even wrapping gifts!"

Activity 2 The Gift Box Challenge

35 mins

Instructions

- Start with a scenario to grab attention: "You are a packaging designer at a chocolate company. Your challenge is to design the perfect gift box that uses the least material but holds the most chocolates."
- Distribute 3 different-shaped real-life models to each group:
  - A cube-shaped box
  - A cylinder box
  - A cone-shaped box (upright)
- Ask students to calculate surface area and volume for each.
- Ask students to measure the dimensions (e.g., side length, radius, height) of the provided templates using rulers. Alternatively, you can pre-measure and provide the exact dimensions on a handout for each template.
- Discuss "Which box uses the least paper but offers the most space?"
- Now, introduce the concept of efficiency: Efficiency = Volume/Surface Area

- Groups compare efficiencies and vote for the "winner box."
- Wrap up the activity by telling: "Product companies use this every day—less packaging, more volume. It saves cost and is eco-friendly!"

Activity 3 Sculptor's Dream

35 mins

Instructions

- Begin the class by telling students: "A sculptor is shaping a clay block that looks like a cone with the top chopped off. How does she calculate how much clay to use or how much to paint?"
- On the board, draw a frustum and label the radii and height.
- Explain the class:
  - This is a **frustum** formed by removing a smaller cone from a larger one.
- Ask students to derive or recall:
  - Volume of frustum:

    $V = \frac{1}{3}\pi h\,(r_1^2 + r_2^2 + r_1 r_2)$
  - Curved surface area:

    $CSA = \pi\,(r_1 + r_2)\,l$

    Where l is the slant height
- Provide example values and ask students to calculate both.
- Also ask students: "How would the values change if the top radius was closer to the bottom?"
- Invite pairs to share their solutions, as each pair solves their system, let them share:
  - What did you eliminate?
  - What method did you choose (addition, subtraction, or multiplication)? Why did you choose that method?
- Conclude the activity by talking about: "Frustums are used in lampshades, buckets, pots, and cooling towers. Understanding their shape helps in resource estimation and cost-saving!"

Assessment

60 mins

Answer the following questions:

1. The shape of an ice-cream cone is a combination of:
   a) Sphere + cylinder
   b) Sphere + cone
   c) Hemisphere + cylinder
   d) Hemisphere + cone
2. If a cone is cut parallel to the base of it by a plane in two parts, then the shape of the top of the cone will be a:
   a) Sphere
   b) Cone
   c) Cone itself
   d) Cylinder
3. Which of the following method(s) is/are used to find the solution of a pair of linear equations algebraically?
   a) Substitution Method
   b) Elimination Method
   c) Cross-multiplication Method
   d) All the above
4. If we cut a cone in two parts by a plane parallel to the base, then the bottom part left over is the:
   a) Cone
   b) Frustum of cone
   c) Sphere
   d) Cylinder
5. If r is the radius of the sphere, then the surface area of the sphere is given by:
   a) $4 \pi r^2$
   b) $2 \pi r^2$
   c) πr^2
   d) $\frac{4}{3} \pi r^2$
6. The radius of the top and bottom of a bucket of slant height 35 cm are 25 cm and 8 cm. Find the CSA.
7. If a cylinder is covered by two hemispheres with a shaped lid of equal shape, then the total curved surface area of the new object will be?
8. A hollow cube of internal edge 22 cm is filled with spherical marbles of diameter 0.5 cm and it is assumed that $\frac{1}{8}$ space of the cube remains unfilled. Then, the number of marbles that the cube can accommodate is?
9. The diameters of the two circular ends of the bucket are 44 cm and 24 cm. The height of the bucket is 35 cm. Find the capacity of the bucket.
10. A solid cylinder of radius r and height h is placed over another cylinder of same height and radius. The total surface area of the shape so formed is?

Answer Key

1. Hemisphere + cone
2. intersecting at (a, b)
3. Cone itself
4. Frustum of cone
5. $4 \pi r^2$
6. Curved surface of bucket = $\pi(R_1 + R_2)$ x slant height (l)

   Curved Surface = $(\frac{22}{7})$ x (25 + 8) x 35

   CSA = 22 x 33 x 5 = 3630 sq.cm.
7. Curved surface area of cylinder = $2\pi rh$

   The curved surface area of hemisphere = $2\pi r^2$

   Here, we have two hemispheres.

   So, total curved surface area = $2\pi rh + 2(2\pi r^2) = 2\pi rh + 4\pi r^2$
8. Volume of cube = 223 = 10648 cm^3

   Volume of cube that remains unfilled = $\frac{1}{8} \times 10648 = 1331\ cm^3$

   volume occupied by spherical marbles = $10648 - 1331 = 9317\ cm^3$

   Radius of the spherical marble = $\frac{0.5}{2} = 0.25$ cm = $\frac{1}{4}$ cm

   Volume of 1 spherical marble = $\frac{4}{3} \times \frac{22}{7} \times \frac{1}{4}3 = \frac{11}{168}\ cm^3$

   Numbers of spherical marbles = $n = 9317 \times \frac{11}{168} = 142296$
9. Given,

   The height of the bucket = h = 35 cm

   Diameter of one circular end of bucket = 44 cm

   Then the radius R = 22 cm

   Diameter of another end = 24 cm

   Then the radius r = 12 cm

   We know that Volume of the bucket = $\frac{1}{3}\pi h[R^2 + r^2 + Rr]$

   $= \frac{1}{3} \times \frac{22}{7} \times 35 \times [(22)^2 + (12)^2 + 22 \times 12] = \frac{35}{3} \times \frac{22}{7} \times (484 + 144 + 264)$

   $= \frac{5 \times 22 \times 892}{3} = 32706.6\ cm^3 = 32.7$ litres.
10. We know that,

    The total surface area of cylinder = $2\pi rh + 2\pi r^2$

    When one cylinder is placed over the other cylinder of same height and radius, then height of the new cylinder will be 2h and radius will be r.

    Thus, the total surface area of the shape so formed = $2\pi r(2h) + 2\pi r^2 = 4\pi rh + 2\pi r^2$

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Class: 10		Subject: Maths		
Roll No.	Name of the Student	Chapter: Surface Areas and Volumes		
		Level 1	Level 2	Level 3

Meghalaya Learning Enhancement Programme

SCIENCE

Chapter 1 : Chemical Reactions and Equations

Activity 1 Science of Rust

35 mins

Materials Required

Three iron nails, three bottles, water, salt, and airtight covers.

Instructions

- Divide the students into three groups and give each group one iron nail.
- Ask the first group to place the nail in a dry bottle, the second group in a bottle with water, and the third group in a bottle with water and salt.
- Ask them to cover all bottles and leave them undisturbed for a week.
- After a week, ask the students to observe the nails and compare them.
- Ask the students:
  a) What difference do you see in each nail?
  b) How does the red coating develop on each nail?
  c) Is this an example of a physical change or chemical change? Why or why not?
  d) Which nail rusted the most?
  e) Why do you think the nail in saltwater rusted the most?
- Explain that rusting is a chemical reaction: Iron + Oxygen + Water → Iron Oxide (Rust)
  $Fe + O_2 + H_2O \rightarrow Fe_2O_3 \cdot xH_2O$
- Explain that salt increases water's conductivity, which speeds up rusting. Also, the salt helps the water to stick to the iron surface making it available for a longer time to react with the nail. The nail in plain water rusted more slowly, while the dry nail showed little or no rust.
- Discuss the climate of Meghalaya and ask if the climate favours the process of rusting. If yes, did they see their parents or neighbours take measures to prevent rusting?
- Guide them to understand how rusting affects tools, bridges, and fences making them less durable and more likely to break over time and how can it be prevented by applying oil, paint, or using stainless steel or a galvanisation process.
- Conclude by saying that rusting is a chemical process. Oxygen and water are both required for iron to rust. Iron will not get rust in dry air. Also, salt dissolved in the moisture (water) increases the process of rusting.

Activity 2 Sugar to Carbon – A Thermal Breakdown

60 mins

Materials Required

Stainless Steel Spoon, Sugar and Source of Heat

Instructions

- Take out a spoonful of sugar using a steel spoon and show it to the students.
- Next, hold the spoon over a flame and ask the students to observe the changes.
- Ask them to observe it more closely as the sugar melts, turns brown, then black, and eventually produces smoke.
- Discuss with students by asking them:
  a) What happens to the sugar when heated?
  b) Why does the colour change from white to brown and then to black?
- Explain that heat causes sugar to melt, caramelise (sticky and brown syrup), and then break down into black carbon residue while releasing smoke.
- Explain that this process is called thermal decomposition, where heat breaks sugar into carbon, water vapour, and carbon dioxide, making the change irreversible.
- Further discuss and ask students:
  a) Have you ever seen food get burnt while cooking?
  b) Why does overcooked sugar turn into caramel or burn completely?
  c) What happens when paper or wood is burned?
- Guide them to understand that most chemical changes cannot be reversed. Thermal decomposition involves breaking down a single reactant into multiple products using heat.

Activity 3 Slaking Lime: The Hidden Heat

35 mins

Materials Required

Limestone Powder, Bowl and Water

Instructions

1. Show a small amount of quicklime (chuna) to the students and place it in a bowl or metal plate.
2. Ask a student to slowly add water while gently stirring the mixture.
3. Ask the students to touch the bowl after 1-2 minutes.

- Ask the students:
  a) What do you feel when you touch the bowl?
  b) Why do you think the bowl feels warm?
- Explain that the reaction is exothermic, meaning it releases heat. Explain the students the difference between exothermic and endothermic reactions.
- Chemical reaction involved:
  Calcium Oxide (Quicklime) + Water → Calcium Hydroxide (Slaked Lime) + Heat
  $CaO + H_2O \rightarrow Ca(OH)_2 + Heat$
- Explain that in Meghalaya, slaked lime is commonly used in betel nut chewing (kwai) and construction (cement and plaster preparation). Discuss with the students what may happen if someone consumes more slaked lime with betelnut or betel leaves.
- Slaked lime from this reaction is also used for whitewashing houses and stabilising soil for agriculture (since slaked lime is basic, it is used to neutralise the excess acid present in the soil) in Meghalaya.
- Conclude the activity by saying that the reactions which release heat are called exothermic reactions, and the reactions which require heat are called endothermic reactions.

Assessment

35 mins

Multiple-Choice Questions:

1. Which of the following conditions accelerates the rusting of iron the most?
   a) Dry air
   b) Distilled water
   c) Saltwater
   d) Oil-coated surface
2. What type of reaction occurs when sugar is heated until it turns black and produces smoke?
   a) Combination reaction
   b) Thermal decomposition
   c) Displacement reaction
   d) Neutralisation reaction
3. What type of reaction is represented by the equation: $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$?
   a) Combination
   b) Decomposition
   c) Displacement
   d) Neutralisation
4. Which of the following is an example of a redox reaction?
   a) $H_2 + Cl_2 \rightarrow 2HCl$
   b) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$
   c) $CaCO_3 \rightarrow CaO + CO_2$
   d) $NaOH + HCl \rightarrow NaCl + H_2O$
5. What happens when magnesium ribbon is burnt in air?
   a) It forms magnesium carbonate
   b) It forms magnesium chloride
   c) It forms magnesium oxide
   d) It forms magnesium hydroxide

Very short answer:

6. Why does rust occur faster in saltwater compared to plain water?

   _____
   _____

7. Why should a magnesium ribbon be cleaned before burning in air? Give a balanced reaction for the burning of magnesium ribbon.

   _____
   _____

Short answer questions:

8. Explain the reaction of quicklime with water. How is this reaction useful in Meghalaya's daily life?

   _____
   _____

9. What is rancidity? How can it be prevented?

_____

_____

Long answer questions:

10. Meghalaya's humid climate contributes to the faster rusting of iron objects. Explain the process of rusting using the chemical equation. Discuss at least two methods to prevent rusting and relate them to real-life applications.

_____

_____

Answer Key

1. c) Saltwater
2. b) Thermal decomposition
3. c) Displacement
4. a) $H_2 + Cl_2 \rightarrow 2HCl$
5. c) It forms magnesium oxide
6. Rusting occurs faster in saltwater because salt (NaCl) enhances the conductivity of water, allowing faster electron transfer in the oxidation-reduction process. This speeds up the reaction of iron with oxygen and water, leading to rapid rust formation.
7. Magnesium ribbon is cleaned to remove the oxide layer that forms on its surface, which can interfere with combustion. The balanced reaction for the burning of magnesium is:

   $2Mg + O_2 \rightarrow 2MgO$
8. When quicklime (CaO) reacts with water, it forms slaked lime ($Ca(OH)_2$) and releases heat.

   $CaO + H_2O \rightarrow Ca(OH)_2 + Heat$

   This reaction is useful in Meghalaya for neutralising acidic soil, which is common due to heavy rainfall. Farmers use slaked lime to improve soil pH and enhance crop productivity.
9. Rancidity occurs when fats and oils react with oxygen, leading to an unpleasant smell and taste. It can be prevented by:
   - Storing food in airtight containers
   - Adding antioxidants like vitamin C and E
   - Refrigeration to slow down oxidation
   - Using nitrogen to replace air in food packaging
10. Rusting Process:

    Rusting is the slow oxidation of iron in the presence of oxygen and water, forming hydrated iron(III) oxide (rust). The chemical reaction is:

    $4Fe + 3O_2 + 6H_2O \rightarrow 4Fe(OH)_3$

    $Fe(OH)_3$ further reacts with oxygen to form rust:

    $2Fe(OH)_3 \rightarrow Fe_2O_3 \cdot xH_2O$ (rust)

    Methods to Prevent Rusting:

    1. Galvanisation – Coating iron with zinc prevents rusting. This is used in Meghalaya for roofing sheets to protect them from moisture.
    2. Painting and Oiling – Applying paint or oil creates a protective layer. This is used on iron gates, fences, and tools to prevent rusting.

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Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Chemical Reaction and Equations		
		Level 1	Level 2	Level 3

Chapter 2 : Acids, Bases and Salts

Activity 1 Exploring Acidity in the Kitchen

35 mins

Materials Required

Pieces of Fruit, Water, Baking soda, Cups and Turmeric Powder

Instructions

- Take small pieces of local fruits, such as oranges and lemons. Crush each fruit separately and mix with a little water in different cups.
- Next, in a separate cup, dissolve a small amount of baking soda in water to create a basic solution.
- Prepare a turmeric solution by mixing turmeric powder with water in another cup.
- Add a few drops of the turmeric solution to each fruit mixture and the baking soda solution and ask the students to observe any colour changes.
- Ask students:
  a) What happens to the colour of the turmeric solution when mixed with different liquids?
  b) Do all liquids cause the same change? Why or why not?
- Guide students to understand that turmeric remains yellow in acidic solutions (like orange and lemon juice) but turns red in a basic solution (like baking soda water).
- Extend the discussion by asking:
  a) Where else do we see acids and bases in everyday life?
  b) Why do some foods taste sour while others do not?
- Conclude by linking the concept to real-life experiences, such as how citrus fruits are acidic and why baking soda is sometimes used to neutralise acidity in food.

Activity 2 The Science of Soil pH

35 mins

Materials Required

Cups, Soil Sample and Vinegar

Instructions

- Divide students into two groups and ask each group to collect soil samples from two different locations and place them in separate cups.
- Pour a few drops of vinegar into each cup and observe whether bubbles (CO_2 gas) form.
- In one of the cups, mix in a small amount of lime powder and repeat the vinegar test.
- Ask students to compare the reactions in both cups:
  a) Did both soil samples react the same way with vinegar?
  b) What difference did adding lime powder make?
- Explain that if bubbles form, the soil contains carbonates, which react with the acid (vinegar) to release carbon dioxide gas.
- Discuss what may happen if the soil is too acidic and how it may affect crop production.
- Highlight how farmers add lime ($CaCO_3$) to reduce soil acidity and improve crop growth.
- Give local examples: Farmers in Meghalaya use limestone to improve soil conditions for crops like broom grass, oranges, and black pepper.
- Conclude by emphasising that maintaining the right soil pH helps farmers grow healthier and more productive crops.

Activity 3 Various Salts

35 mins

Materials Required

Table salt (Sodium chloride - NaCl), Baking soda (Sodium bicarbonate - $NaHCO_3$), Plaster of Paris (Calcium sulphate - $CaSO_4.½H_2O$)

Instructions

- Place small amounts of each salt in separate cups and ask students to observe and compare their texture, colour, and solubility in water.
- Add a few drops of vinegar or lemon juice to all the cups and ask the students to observe.
- Ask the students to note down the change after adding vinegar or lemon juice. Ask the students
  a) Did they see anything different in any of the cups?
  b) Which cup produced the effervescence? (Effervescence indicates CO_2 release.)
  c) Can you guess which gas is released from that cup?
- Discuss the uses of these salts in daily life:
  - Table salt: Used in cooking and food preservation.
  - Baking soda: Used in baking, fire extinguishers, and as an antacid.
  - Plaster of Paris: Used in making toys, molds and medical casts.
- Discussion Questions:
  a) Why can baking soda be used as a fire extinguisher?
  b) Why is baking soda used in cooking and medicine?
  c) Why is Plaster of Paris used in making the medical casts?
- Explain to the students that baking soda acts as a fire extinguisher because it decomposes when heated, releasing carbon dioxide gas that displaces oxygen and smothers the fire.
- Baking soda is used in cooking to make food light and fluffy because it releases carbon dioxide when heated, and the carbon dioxide leaves the food, leaving spaces in the middle making it spongy and fluffy. It is used in medicine to relieve acidity and indigestion by neutralising excess stomach acid because baking soda is basic in nature.
- Plaster of Paris is used in making medical casts because it hardens quickly when mixed with water, providing strong support while remaining lightweight and moldable to freeze the movement of the broken bones.
- Conclude by saying that this activity demonstrates how different household salts interact with acids and bases, highlighting their unique properties and uses. Understanding these reactions helps us appreciate the role of salts in everyday life, from cooking and medicine to preservation.

Assessment

35 mins

Multiple-Choice Questions:

1. Which gas is released when an acid reacts with a metal?
   a) Oxygen
   b) Hydrogen
   c) Carbon dioxide
   d) Nitrogen
2. A bakery uses baking soda in cake preparation. What is the primary reason for this?
   a) To increase the weight of the cake
   b) To release carbon dioxide for making the cake fluffy
   c) To enhance the sweetness of the cake
   d) To provide an acidic taste
3. What is the primary purpose of adding quicklime (CaO) to acidic soil?
   a) To increase acidity
   b) To neutralise the soil
   c) To make the soil excessively alkaline
   d) To reduce water retention
4. What is the role of baking soda in medicine?
   a) It prevents bacterial growth in water
   b) It helps the body absorb water more efficiently
   c) It neutralises stomach acid
   d) It changes the pH of water
5. What colour change is observed when turmeric solution is added to an acidic fruit juice like orange or lemon?
   a) Blue to green
   b) Yellow to red
   c) No change
   d) Red to blue

Very short answer:

6. A solution has a pH of 8.2. Is it acidic, basic, or neutral? What will happen if a few drops of lemon juice are added to this solution?

   _____
   _____

7. How does Plaster of Paris help in fixing broken bones?

   _____
   _____

Short answer questions:

8. A student accidentally spills hydrochloric acid on their hand. The school lab has slaked lime, vinegar, and baking soda available. Which one should be used for first aid and why?

   _____
   _____

9. How does soil pH affect plant growth? Suggest a method to improve soil conditions for farming in Meghalaya.

   _____
   _____

Long answer questions:

10. Meghalaya is known for its limestone reserves. Hence, a lot of cement factories are found in the state. A cement factory releases acidic waste into a nearby river, affecting aquatic life. Explain how the acidic waste can be treated before disposal. What role does pH play in the survival of aquatic organisms?

    _____
    _____
    _____
    _____

Answer Key

1. b) Hydrogen
2. b) To release carbon dioxide for making the cake fluffy
3. b) To neutralise the soil
4. c) It neutralises stomach acid
5. c) No change
6. The solution is basic since its pH is above 7. If a few drops of lemon juice (acidic) are added, the pH will decrease, making the solution less basic or neutral, depending on the amount added.
7. Plaster of Paris (POP) is used in making medical casts because it sets quickly when mixed with wa-ter and hardens to provide support to broken bones. It is lightweight and can be moulded easily be-fore it hardens, ensuring the freezing of the movement of the injured area.
8. Baking soda should be used because it is a weak base that can neutralise the strong acid (HCl) on the skin, preventing further damage. Slaked lime is also a base, but it is too strong and may cause burns. Vinegar, being acidic, would worsen the situation.
9. Soil pH affects plant growth by influencing nutrient availability. Most plants grow best in slightly acidic to neutral soil (pH 6-7). Acidic soils in Meghalaya reduce the availability of essential nutrients. To improve soil conditions, farmers add lime ($CaCO_3$) to neutralise excess acidity and create a favourable environment for crops.
10. Acidic waste from cement factories can be treated using neutralising agents like lime (CaO) or cal-cium carbonate ($CaCO_3$) before disposal. pH plays a crucial role in the survival of aquatic organisms because most aquatic life thrives in water with a pH between 6.5 and 8.5. Highly acidic water can harm fish and disrupt ecosystems. Proper pH regulation ensures a balanced aquatic environment, preventing the loss of biodiversity.

Learning Level Tracker

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Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Acids, Bases and Salts		
		Level 1	Level 2	Level 3

Chapter 5 : Life Processes

Activity 1 How Plants Drink Water

35 mins

Materials Required

Fresh white flower (or a leafy stem from a local plant like mustard, coriander, or wild spinach), a transparent glass or bamboo cup, water, and turmeric paste (if available).

Instructions

- Divide students into groups and provide them with a leafy stem or flower.
- Ask them to fill a glass or bamboo cup with water and mix in a pinch of turmeric or natural plant dye (if available).
- Ask them to place the stem inside and leave it undisturbed for a few hours.
- After some time, ask them to observe any changes in the colour of the leaves or stem veins.
- **Ask the students:**
  - What changes do you see in the leaves or flowers?
  - How did the colour move through the plant?
  - What does this tell us about how plants absorb water?
  - Why do trees in Meghalaya grow well during the monsoon?
- Explain that water moves up from the roots through the stem using xylem, which acts like a straw. This process is called capillary action and is helped by transpiration (water loss from leaves) and the colour in the water helps us see how the water travels through the plant.
- And that this is why trees in Meghalaya remain green and healthy even in hilly areas, as they can absorb and transport water efficiently from the soil.
- Discuss with the students if they have seen banana plants growing well even after being cut at the base and explain that this is because the roots keep pulling water up.

Activity 2 How Food Travels in Plants

35 mins

Materials Required

Blackboard, small pieces of paper

Instructions

- Draw a basic plant diagram on a chalkboard.
- Write "Water," "Minerals," "Sunlight," "Carbon dioxide," and "Food" on small papers or dried leaves.
- Ask students to place these labels in the correct parts of the plant (e.g., "Water" near the roots, "Food" near the leaves).
- Discuss how the plant gets and transports each of these elements.
- Ask the students:
  - Where does the plant get water and minerals from?
  - How does the plant prepare its own food?
  - How is the food transported to different parts of the plant?
  - What happens to stored food in plants like potatoes?
- Explain that water and minerals are absorbed by the roots and move up through the xylem, relate it to leaves preparing food using sunlight in photosynthesis (Carbon dioxide + Water + Sunlight → Food + Oxygen).
- Explain that the food moves to different parts of the plant through phloem, just like how people carry food from the market to their homes!
- Relate this to common crops in Meghalaya like ginger, and Colocasia (Kashriew in Khasi, Kachu in Assamese)—these plants store extra food in their roots and stems.
- Ask students if they have noticed rice plants turning yellow before harvest. Explain that this happens as the plant ages and chlorophyll breaks down, a process called senescence (natural ageing of the plant). Some nutrients from the leaves also move into the grains during this time.
- Conclude by explaining that farmers use this natural process to determine the right harvest time, ensuring the grains are mature and contain maximum stored nutrients.

Activity 3 How Our Kidneys Work – A Natural Filtration Experiment

35 mins

Materials Required

A clay pot or bamboo filter, sand, charcoal (burnt wood), small pebbles, and muddy water from a nearby source.

Instructions

- Fill a clay pot or a cut bamboo tube with layers of pebbles at the bottom, sand in the middle, and charcoal on top.
- Pour muddy water through the filter and ask students to observe how cleaner water drips out.
- Ask students to compare the filtered water with the original muddy water.
- Ask the students:
  - Observation & Functioning: How did the filter change the dirty water? Which material helped clean the water the most?
  - Connection to the Human Body: How does this experiment relate to our kidneys?
- Explain that kidneys act as natural filters: Just as a filter removes dirt from water, kidneys filter blood to remove waste like urea, which is produced when the body breaks down proteins. Urea needs a large amount of water to be dissolved which comes out of the body in the form of urine. They also help maintain the right balance of water, salts, and minerals.
- Explain that if kidneys fail, waste builds up in the body, leading to serious health problems. In rural Meghalaya, many people rely on natural springs or rivers for drinking water. Contaminated water can cause infections and diseases. Traditional filtration methods, like charcoal or sand inside bamboo pipes, help remove impurities, but additional purification steps like boiling are important to kill the germs.
- Conclude by discussing how drinking clean water is essential to be healthy. Drinking enough and clean water is crucial for maintaining healthy kidneys.

Assessment

35 mins

Multiple Choice Questions (MCQs)

1. In human beings, which organ is responsible for filtering waste from the blood?
   a) Liver
   b) Kidney
   c) Lungs
   d) Stomach
2. Which of the following helps transport water in plants?
   a) Xylem
   b) Phloem
   c) Stomata
   d) Chloroplast
3. The process by which plants lose water in the form of vapour is called:
   a) Translocation
   b) Transpiration
   c) Photosynthesis
   d) Respiration
4. What is the main excretory product in human urine?
   a) Carbon dioxide
   b) Oxygen
   c) Urea
   d) Glucose
5. Why do mammals and birds have separate chambers for oxygenated and deoxygenated blood?
   a) To prevent blood loss
   b) To maintain constant body temperature
   c) To store oxygen for later use
   d) To remove waste quickly

Very Short Answer Questions

6. Name two ways in which plants remove waste from their bodies.

   _____

7. Why is it important to stay hydrated for proper kidney function?

   _____

Short Answer Questions

8. Explain how food is transported in plants.

   _____

   _____

9. What role do nephrons play in the excretion of waste in human beings?

   _____

   _____

Long Answer Question

10. Explain the process of excretion in human beings. How does the excretory system ensure that only waste is removed while essential substances are retained?

    _____

    _____

    _____

Answer Key

Multiple Choice Questions (MCQs)

1. b) Kidney
2. a) Xylem
3. b) Transpiration
4. c) Urea
5. b) To maintain constant body temperature

Very Short Answer Questions

6. Two ways plants remove waste:
   Storing waste in vacuoles, leaves, or old xylem as resins and gums.
   Releasing oxygen as a byproduct of photosynthesis.
7. Importance of staying hydrated for kidney function:
   Water helps flush out waste products like urea from the body.
   It prevents kidney stones and reduces the risk of infections.

Short Answer Questions

8. How food is transported in plants:
   Food is transported through phloem in a process called translocation.
   It moves from leaves (where it is produced) to different parts of the plant.
   Movement occurs due to differences in osmotic pressure, driven by ATP.
9. Role of nephrons in excretion:
   Nephrons are the filtration units in the kidney.
   They filter waste, excess salts, and water from the blood.
   Useful substances like glucose and water are reabsorbed, and waste is excreted as urine.

Long Answer Question

10. Process of excretion in human beings:
    The excretory system includes the kidneys, ureters, urinary bladder, and urethra.
    Kidneys filter blood and remove nitrogenous waste like urea. Filtration occurs in nephrons, where useful substances (water, glucose) are reabsorbed.
    Waste is collected as urine, which passes through the ureters to the bladder.
    Urine is stored in the bladder until it is excreted through the urethra.
    The system ensures only harmful substances are removed while essential nutrients are retained in the body.

Learning Level Tracker

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Name of the School:	**UDISE:**
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Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Life Processes		
		Level 1	Level 2	Level 3

Chapter 6 : Control and Co-ordination

Activity 1 Test Your Reflexes

35 mins

Materials Required

A 30 cm ruler (or any straight object with markings)

Instructions

- Divide students into pairs and assign one student as the "dropper" and the other as the "catcher."
- Instruct the dropper to hold the ruler vertically at the 30 cm mark, while the catcher keeps their fingers ready near the bottom without touching it.
- Tell the dropper to let go of the ruler without warning, and the catcher must grab it as quickly as possible.
- Ask students to note the mark where they caught the ruler (lower numbers indicate faster reaction time). Repeat this process 3 times and calculate the average reaction distance.
- Encourage students to think about why they were able to catch the ruler or why they missed it.
- Ask students
  - Which senses and body parts were involved in this process?
  - How this test demonstrates how the brain processes signals in voluntary reactions?
- Explain that catching the ruler is a reaction, not a reflex. The eyes detect the falling ruler and send a signal to the brain, which then processes the information and sends commands to the muscles to catch it.
- Clarify that reflex actions, like pulling a hand away from a hot object or blinking when something comes close, do not involve the brain first. Instead, the spinal cord sends an immediate response to the muscles.
- Highlight that reaction time can be influenced by factors such as alertness, fatigue, and nutrition.
- Emphasise that good nutrition, including proteins and vitamins like B12 and D, helps maintain nerve function and quick muscle responses.
- Conclude by explaining that having a quick reaction time is important for activities like sports and driving, while reflexes help protect the body from harm.

Activity 2 Hormone Role-Play: Adrenaline in Action!

35 mins

Materials Required

Paper slips with real-life scenarios

Instructions

- Write different situations on paper slips, such as:
  - *"Climbing a tree and suddenly slipping."*
  - *"Hearing a loud noise in the dark."*
  - *"Escaping from a barking dog."*
  - *"Getting ready to run in a school race."*
- Divide students into small groups. Each group picks a slip and acts out the scenario, showing:
  - Physical changes (e.g., fast heartbeat, sweating, widened eyes).
  - Emotional reactions (e.g., shouting, freezing, running away).
- After each performance, the class guesses which hormone is responsible (adrenaline) and lists its effects.
- Ask students:
  - Why did their heartbeat increase during the role-play?
  - What changes did they feel in their body during the activity?
- Explain that adrenaline prepares the body for action by increasing heart rate and breathing, making muscles tense, causing sweating to cool the body, and widening pupils for better vision. This automatic response is known as "fight or flight."
- Discuss how adrenaline is essential for survival as it helps the body respond quickly to danger or excitement. Ask students to recall a time they experienced an adrenaline rush and discuss how focus and breathing can help control it in stressful situations.

Activity 3 The Shy Plant

35 mins

Materials Required

Mimosa Pudica ("Lajwanti"), sticks, water.

Instructions

- Show a Mimosa plant and ask, “Why do its leaves close when touched?”
- Explain that, unlike humans, plants do not have nerves but still respond to stimuli using internal mechanisms.
- Ask students to gently touch the leaves and observe them folding. Have them measure and record the time taken for the leaves to reopen.
- Pour water on the soil and observe if the leaves react. Discuss why Mimosa responds to touch but not to watering.
- Use sticks to tap the leaves with different strengths and observe whether the response changes.
- Ask, “How do plants sense and respond to their environment without nerves?”
- Introduce the concept of turgor pressure (changes in water pressure inside specialised cells) as the mechanism behind Mimosa’s movement. Explain that the plant actively moves to protect itself from herbivores or environmental stress.
- Mention that while some plants react to changes in humidity before rain, Mimosa pudica responds specifically to touch. Discuss how Khasi farmers observe plant behaviours to understand environmental conditions.
- Conclude by explaining that plants lack a nervous system but still respond to external changes through water pressure and chemical coordination.
- Encourage students to share examples of other plants reacting to their surroundings, such as sunflowers tracking the sun or Venus flytraps closing around insects.

Assessment

35 mins

Multiple Choice Questions (MCQs)

1. Which part of the brain maintains posture and balance?
   a) Cerebrum
   b) Cerebellum
   c) Medulla
   d) Hypothalamus
2. The gap between two neurons where impulses are transmitted is called:
   a) Axon
   b) Synapse
   c) Dendrite
   d) Reflex arc
3. Which plant hormone promotes growth in stems?
   a) Abscisic acid
   b) Auxin
   c) Cytokinin
   d) Ethylene
4. Adrenaline is secreted by which gland during emergencies?
   a) Thyroid
   b) Adrenal
   c) Pituitary
   d) Pancreas
5. The "touch-me-not" plant (Mimosa) folds its leaves due to:
   a) Growth-independent movement
   b) Geotropism
   c) Photosynthesis
   d) Transpiration

Very Short Answer Questions

6. Name two hormones involved in regulating blood sugar levels.

   _____

7. Why is iodine important in our diet?

   _____

   _____

Short Answer Questions

8. Explain how electrical impulses travel in neurons.

   _____

   _____

9. How does auxin help plants bend toward light?

_____
_____
_____

Long Answer Question

10. Describe the reflex arc with a diagram. How does it help organisms survive in emergencies? Compare it with voluntary actions.

_____
_____
_____
_____
_____

Answer Key

Multiple Choice Questions (MCQs)

1. b) Cerebellum
2. b) Synapse
3. b) Auxin
4. b) Adrenal
5. a) Growth-independent movement

Very Short Answer Questions Answer Key

6. Two hormones for blood sugar regulation:
   - o Insulin *(lowers blood sugar)*
   - o Glucagon *(raises blood sugar)*
7. Iodine is important because:
   It is essential for thyroxine hormone production, which regulates metabolism. Deficiency causes goitre.

Short Answer Questions Answer Key

8. Electrical impulse transmission in neurons:
   - o Impulse starts at dendrites → travels through cell body → along axon → reaches synapse.
   - o At synapse, chemicals (neurotransmitters) carry the signal to the next neuron.
9. Auxin and phototropism:
   - o Auxin accumulates on the shaded side of stems.
   - o Causes cells to elongate, making the plant bend toward light.

Long Answer Question Answer Key

10. Reflex arc and survival:
    - Process:
      1. Receptor detects stimulus (e.g., heat).
      2. Sensory neuron → spinal cord → motor neuron → muscle (e.g., hand withdrawal).
      3. Brain registers pain *after* the action.
    - Diagram labels: Receptor → sensory neuron → spinal cord → motor neuron → effector.
    - Survival advantage: Faster than voluntary actions (bypasses brain).
    - Comparison:

Reflex Action	Voluntary Action
Instant (spinal cord)	Slower (brain)
Automatic (e.g., blinking)	Conscious (e.g., writing)

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Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Control and Co-ordination		
		Level 1	Level 2	Level 3

Chapter 9 : Light - Reflection and Refraction

Activity 1 Exploring Refraction

35 mins

Materials Required

A transparent glass or plastic container (any clear container will work, Water, A pencil or stick (anything with a distinct shape)

Instructions

- Fill a transparent container with water, using a clear glass or plastic container so students can observe how light bends.
- Hold a pencil or stick at an angle and submerge it halfway into the water, ensuring it is visible both inside and outside the water.
- Ask students to observe the pencil carefully. Guide them to notice that the pencil appears bent or shifted at the water's surface.
- Ask students to describe what they observed. Explain that the pencil itself is not actually bent—this is an optical illusion caused by the bending of light as it moves from air (a less dense medium) into water (a denser medium).
- Introduce the concept of refraction, explaining that light changes speed when moving between different materials, causing it to bend.
- Clarify that refraction happens at the boundary where two different media meet, not within the medium itself.
- Ask students to think about other materials where light might bend, such as glass, oil, or air. Ask them to predict whether light would bend more, less, or not at all in those materials.
- Discuss how this principle of refraction is used in eyeglasses, magnifying glasses, microscopes, and even in the formation of rainbows.

Activity 2 Convex Lenses and Focusing Light

35 mins

Materials Required

A magnifying glass or any convex lens, A white sheet of paper, Natural sunlight (or a lamp with a strong light source)

Instructions

- Choose a bright, sunny day for this activity or use a lamp with a strong light source. Gather a convex lens (such as a magnifying glass) and a white sheet of paper.
- Hold the convex lens a few inches above the white paper, positioning it so that sunlight passes through the lens and is focused onto the paper. Ensure students do not stare at the sun or hold the lens in one spot for too long.
- Ask students to observe how the light converges at a specific point on the paper, forming a small, bright spot.
- Explain that this bright spot is called the focal point of the convex lens. Emphasise that a convex lens bends (or converges) light rays so they meet at this focal point.
- Guide students to think about why light focuses in one spot. Explain that light rays from the sun are nearly parallel when they reach Earth, and the convex lens bends these rays inward, bringing them together at the focal point.
- Ask students to experiment with changing the distance between the lens and the paper. Encourage them to observe how the size and brightness of the focal point change.
- Discuss how different types of lenses (convex and concave) are used in optical devices like eyeglasses, cameras, and microscopes to focus or spread light.
- Provide real-world examples, such as how magnifying glasses can concentrate light, how cameras use lenses to focus images, and how human eyes adjust focus using a natural convex lens.
- Reinforce the concept by asking students how the focal point changes when they move the lens closer or farther from the paper.

Activity 3 Understanding Lens Power and Corrective Eyewear

35 mins

Materials Required

A pair of old corrective glasses (or any magnifying glasses), Paper and pen for calculations, Simple formula for lens power: P=1/F (where P is the power in dioptres and f is the focal length in metres)

Instructions

- Start by explaining that lenses are used in optical devices to focus light. Show a pair of old corrective glasses or a magnifying glass and explain that these lenses help people see clearly by adjusting the way light enters the eye.
- Introduce two types of lenses:
  - Convex lenses (converging lenses) are thicker in the middle and help people who are farsighted (hyperopia).
  - Concave lenses (diverging lenses) are thinner in the middle and help people who are nearsighted (myopia).
- Explain that the strength of a lens is measured by its power (P), which depends on its focal length (F, measured in metres). The formula to calculate lens power is:

$$P=\frac{1}{F}$$

  where P is in diopters (D) and F is in metres (m).
- Provide students with focal lengths and ask them to calculate lens power:
  - What is the power of a lens with a focal length of 1 metre?
  - What is the power of a lens with a focal length of 0.25 metres?
  - Which has more power?
- Discuss how positive power lenses (convex lenses) correct farsightedness, while negative power lenses (concave lenses) correct nearsightedness.
- Ask students why different people need different lens powers. Guide them to understand that the shape of the eyeball affects how light is focused inside the eye, requiring different lens corrections.
- Use local examples to discuss the need for corrective eyewear. Explain how long exposure to bright sunlight, foggy conditions, or dim lighting in rural homes can cause eye strain, increasing the need for vision correction.
- Encourage students to think about how lenses are used beyond glasses, such as in cameras, microscopes, and telescopes.

Assessment

35 mins

Multiple Choice Questions (MCQs)

1. Which phenomenon causes a pencil to appear bent when placed in a glass of water?
   a) Reflection
   b) Dispersion
   c) Refraction
   d) Diffraction
2. The focal length of a concave mirror is 10 cm. What is its radius of curvature?
   a) 5 cm
   b) 10 cm
   c) 20 cm
   d) 40 cm
3. When light travels from air to glass, it:
   a) Bends away from the normal
   b) Bends towards the normal
   c) Travels straight
   d) Reflects completely
4. Which mirror always produces a virtual, erect, and diminished image?
   a) Concave mirror
   b) Convex mirror
   c) Plane mirror
   d) Parabolic mirror
5. The power of a lens is +2.0 D. This lens must be:
   a) Concave lens
   b) Convex lens
   c) Plane glass
   d) Cylindrical lens

Very Short Answer Questions

6. State the laws of reflection.

   _____

7. Define 1 dioptre of power of a lens.

   _____

   _____

Short Answer Questions

8. Explain why a convex lens is called a converging lens with a ray diagram.

   _____

   _____

9. An object is placed at 30 cm from a convex lens of focal length 20 cm. Calculate the image position using the lens formula.

_____
_____
_____
_____

Long Answer Question

10. (a) Derive the mirror formula for a concave mirror.

    (b) An object 4 cm tall is placed 15 cm from a concave mirror of focal length 10 cm. Calculate the image position, size, and nature. Draw the ray diagram.

Answer Key

MCQs

1. c) Refraction
2. c) 20 cm (R = 2f)
3. b) Bends towards the normal
4. b) convex mirror
5. b) convex lens (Positive power indicates converging lens)

Very Short Answers

6. Laws of Reflection:
   Incident ray, reflected ray, and normal lie in the same plane.
   Angle of incidence = Angle of reflection.
7. 1 Dioptre: Power of a lens with focal length 1 metre.

Short Answers

8. Convex lens as converging:
   Parallel rays converge at focus after refraction.
   Diagram should show: Parallel rays → converge at F (focal point).
9. Lens formula calculation:
   Given: u = -30 cm, f = +20 cm
   Using 1/v - 1/u = 1/f → v = +60 cm (real image on opposite side).

Long Answer

10. (a) Mirror formula derivation:
    Start with ray diagram showing object (u), image (v), and focal point (f).
    Use similar triangles to derive 1/v + 1/u = 1/f.
    (b) Numerical solution:
    Given: u = -15 cm, f = -10 cm, h_o = 4 cm
    Mirror formula → v = -30 cm (real, inverted image).
    Magnification (m) = -v/u = -2 → Image height = 8 cm (enlarged).
    Ray diagram: Show F, C, parallel ray → F, central ray → C, focal ray → parallel.

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Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Light - Reflection and Refraction		
		Level 1	Level 2	Level 3

Chapter 10 : Human Eye and The Colourful World

Activity 1 How Lenses Work

35 mins

Materials Required

Concave and convex lenses (borrowed from old spectacles or magnifying glasses), sheet with large and small text

Instructions

- Give students a convex lens and ask them to place it in front of a printed sheet.
- Ask them to slowly move the lens closer and farther from the sheet and observe when the text appears clear or blurry.
- Now, repeat the activity with a concave lens and ask students to observe any differences in image formation.
- Explain to them that a convex lens converges light rays—it focuses them to form a sharper image at a particular distance and add that it is like how the eye lens focuses light to form a clear image on the retina.
- Further describe how a concave lens diverges light rays, making the image appear smaller and spread out and that this mimics how myopia (near-sightedness) affects vision, where the image forms in front of the retina instead of at the correct position.
- Conclude by discussing:

  Myopia (near-sightedness) occurs when the image forms in front of the retina. Concave lenses are used to diverge the light rays slightly so the image moves backward onto the retina.

  Hypermetropia (far-sightedness) occurs when the image forms behind the retina. Convex lenses are used to converge the light rays more strongly so the image shifts forward onto the retina.

Activity 2 Bending Light

35 mins

Materials Required

A transparent water-filled glass or clear plastic bottle, sheet of white paper, torch or phone flashlight, pencil to trace observations

Instructions

- Begin by asking students:
    - *"Have you ever noticed how objects look distorted underwater?"*
    - *"Why does a pencil dipped in water appear bent?"*
- Explain that this happens due to refraction, or the bending of light when it moves from one material (air) into another (water or glass).
- Now, fill a transparent glass or plastic bottle with clean water and place a white sheet of paper behind it on a table. Turn on a torch or phone flashlight and shine the light at the glass from one side.
- Encourage students to see how light bends as it passes through the curved surface of the glass. Move the light source to different angles and ask them to observe how the bending changes.
- Now, draw an arrow or simple shape on the white paper behind the glass, and ask students to look at the drawing through the water-filled glass.
- Discuss with the students how the image looks different—if it looks shifted, enlarged, or flipped?
- Explain that this happens because light rays bend when they enter water and again when they exit and that similar bending occurs in a prism, but in a sharper way due to its angled surfaces.

Guide them to understand that light travels faster in air and slower in water and when light enters a denser material (like water), it changes speed and direction, causing refraction. Add that this is why objects underwater or behind curved glass surfaces appear distorted or shifted.

Activity 3 Scattering of Light

35 mins

Materials Required

A transparent glass or plastic bottle filled with clear water, a small amount of milk or detergent, torch or phone flashlight, dark room or shaded area

Instructions

- In a dark room or shaded area, fill a transparent glass or plastic bottle with clean water and add a few drops of milk or a pinch of detergent and stir.
- Turn on a torch or phone flashlight and shine the beam through the side of the bottle.
- Encourage students to observe how the light path becomes visible inside the milky water and discuss why the beam of light is now visible, relating it to how small particles scatter light.
- Ask students to try different angles of light and observe changes in scattering effects.
- Compare this scattering to phenomena in the environment like the blue sky, red sunsets, or sunlight filtering through mist and explain how smaller particles scatter shorter wavelengths like blue, while larger particles scatter longer wavelengths like red.

Assessment

35 mins

Multiple-Choice Questions (MCQs)

1. What is the least distance of distinct vision for a young adult with normal vision?
    a) 10 cm
    b) 25 cm
    c) 50 cm
    d) 100 cm
2. Myopia is a defect of vision where:
    a) Distant objects appear clear but nearby objects are blurry
    b) Nearby objects appear clear but distant objects are blurry
    c) Both distant and nearby objects appear blurry
    d) The eye loses its ability to adjust focal length
3. Hypermetropia is corrected using:
    a) Concave lens
    b) Convex lens
    c) Cylindrical lens
    d) Bifocal lens
4. What causes the blue colour of the sky?
    a) Dispersion of light
    b) Reflection of light
    c) Scattering of light
    d) Refraction of light
5. The splitting of white light into its component colours is called:
    a. Refraction
    b. Scattering
    c. Dispersion
    d. Reflection

Very Short Answer Questions

2. Define accommodation of the eye.

    _____

3. What is presbyopia?

    _____

Short Answer Questions

4. The Sun is visible to us about 2 minutes before the actual sunrise. Why?

    _____

5. Why does the sky appear blue?

    _____

    _____

Long Answer Question

6. Describe the various refractive defects of vision and their corrections.

    _____

    _____

    _____

    _____

Answer Key

1. b) 25 cm
2. b) Nearby objects appear clear but distant objects are blurry
3. b) Convex lens
4. c) Scattering of light
5. c) Dispersion

2. The ability of the eye to focus on both near and distant objects by adjusting its focal length.
3. Presbyopia is a condition where the eye loses its power of accommodation, typically due to aging.
4. The atmosphere bends the light from the Sun, letting us see it a few minutes before it actually rises above the horizon.
5. The sky appears blue due to the scattering of shorter wavelengths of light by the atmosphere.
6. Myopia (short-sightedness) occurs when distant objects appear blurry as their images focus before the retina. It is corrected using a concave lens, which helps diverge light rays for proper focus. Hypermetropia (far-sightedness) causes nearby objects to appear blurry because their images focus beyond the retina; a convex lens is used to converge light rays and bring the focus to the correct position. Presbyopia, common in aging individuals, results from the weakening of the eye's ability to adjust focal length, affecting both near and distant vision. It is corrected using bifocal or progressive lenses that combine concave and convex properties to aid clear vision at different distances

Learning Level Tracker

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Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Human Eye and The Colourful World		
		Level 1	Level 2	Level 3

Chapter 3 : Metals and Non-Metals

Activity 1 Acids and Metals

35 mins

Materials Required

Metal Samples (iron nails, aluminium foil, zinc strips), Vinegar, 3 cups

Instructions

- Prepare separate clear cups or bowls and fill them halfway with vinegar and place a small piece of each metal sample into its respective cup of vinegar.
- Ask the students to observe the reactions closely and encourage students to pay attention to whether bubbles form around the metal pieces.
- Explain that the bubbles are hydrogen gas being released during a chemical reaction between the metal and the vinegar (acid), guiding the students to understand that the presence or absence of bubbles indicates how reactive the metal is with the acid.
- Discuss and compare the intensity of reactions. Some metals, like aluminium and zinc, will likely produce more bubbles, showing greater reactivity. Other metals, like copper, may not react visibly at all.
- Ask students to arrange the metals in decreasing order of their reactivity based on the observations they made during the activity.
- Conclude by discussing why some metals are more reactive than others and relate this to real-world applications, like using reactive metals in certain industrial processes while using less reactive metals for making coins and jewellery.

Activity 2 Cold, Hot or Steam

35 mins

Materials Required

Metal samples (calcium chalk, iron nail, aluminium foil), 3 bowls, lid and water,

Instructions

- Divide the metal samples into three tests: cold water, hot water, and steam.
- Place each metal sample in separate bowls filled with cold water and observe if bubbles form, indicating hydrogen gas release.
- For metals that do not react with cold water, gently heat a second set of bowls containing water and place the metal samples inside. Observe again for bubbles or floating due to hydrogen gas.
- For metals that show no reaction with hot water, set up a steam apparatus. Boil water and expose the metals to steam by suspending them above the boiling water. Check for reactions and gas production.
- Discuss the observations and highlight metals like potassium and sodium that react most vigorously with cold water, producing hydrogen gas and heat so rapidly that it ignites and point out how calcium reacts less violently, with the hydrogen gas forming bubbles that make the metal float.
- Explain the difference between metals like magnesium, which react only with hot water, and others like aluminium, iron, and zinc, which require steam to show a reaction. Explain how metals such as lead, copper, silver, and gold do not react with water under any conditions during this experiment.
- Relate this to the importance of storing reactive metals like potassium and sodium in kerosene to prevent accidental fires, and why metals like copper and gold are often chosen for plumbing and jewellery due to their lack of reactivity.
- Conclude the activity by discussing the observations. Highlight that ionic compounds are hard and brittle due to strong inter-ionic forces and have high melting points because significant energy is needed to break these bonds. Explain their solubility in water, where water molecules separate the ions, while non-polar solvents like kerosene cannot. Relate these properties to real-world uses, such as water purification, industrial processes, and high-temperature applications, making the connection between their structure and their practical importance clear.

Activity 3 Salt and Soda

35 mins

Materials Required

Common Salt, Baking Soda and Bowls

Instructions

- Divide students into small groups for this activity and explain to them that an ionic compound is a substance formed when a metal and a non-metal chemically bond by transferring electrons.
- Provide each group with a small amount of salt or baking soda.
- Understanding Physical Nature
    - Ask them to gently press the sample with a spoon or fingertip and observe that these compounds are hard and brittle, breaking into smaller pieces when pressure is applied.
- Solubility Test
    - Place water in one bowl and kerosene or vegetable oil in another and add a small amount of the ionic compound to both liquids and stir.
    - Observe that the compound dissolves readily in water but remains insoluble in kerosene or oil.
- Heating Test
    - Heat a small amount of the ionic compound in a metal spoon over a candle or burner flame (with teacher supervision).
    - Ask the students to observe whether the compound melts or changes colour and explain that ionic compounds have high melting points because their strong inter-ionic attractions require a significant amount of energy to break.
- Conclude the activity by explaining that baking soda and common salt dissolve well in water but not in kerosene, highlighting their ionic nature. Both are hard solids, with baking soda decomposing when heated and salt remaining brittle, reflecting typical properties of ionic compounds and their behaviour in different settings.

Assessment

35 mins

Multiple-Choice Questions (MCQs)

1. Which of the following is an exception among metals by being a liquid at room temperature?
   a) Zinc
   b) Aluminium
   c) Mercury
   d) Copper
2. Amphoteric oxides exhibit properties of both acidic and basic oxides. Which of the following is an amphoteric oxide?
   a) Magnesium oxide
   b) Zinc oxide
   c) Sodium oxide
   d) Calcium oxide
3. In the reactivity series, which metal can displace zinc from zinc sulphate solution?
   a) Copper
   b) Iron
   c) Magnesium
   d) Silver
4. What happens when a more reactive metal is added to a salt solution of a less reactive metal?
   a) The reactive metal dissolves
   b) The less reactive metal is displaced
   c) No reaction occurs
   d) The solution evaporates
5. Which of the following is a good conductor of electricity despite being a non-metal?
   a) Sulphur
   b) Graphite
   c) Phosphorus
   d) Carbon dioxide

Very Short Answer Questions

2. Define an alloy.

   _____

3. What is corrosion?

   _____

Short Answer Questions

4. How do metals react with oxygen, and what are amphoteric oxides?

   _____

   _____

5. What is metallurgy?

   _____

   _____

Long Answer Question

6. Explain the differences between metals and non-metals in terms of physical properties, chemical behaviour, and conductivity.

   _____

   _____

   _____

Answer Key

1. c) Mercury
2. b) Zinc oxide
3. c) Magnesium
4. b) The less reactive metal is displaced
5. b) Graphite

3. An alloy is a homogeneous mixture of two or more metals, or a metal and a non-metal.
4. Corrosion is the process in which the surface of some metals, such as iron, is degraded due to prolonged exposure to moist air.
5. Metals react with oxygen to form basic oxides, while amphoteric oxides, such as aluminium oxide and zinc oxide, show both acidic and basic properties.
6. Metallurgy is the process of extracting metals from ores and refining them into pure, usable forms through steps like ore concentration and reduction of metal compounds.
7. Metals are generally lustrous, malleable, ductile, and good conductors of heat and electricity, while non-metals lack these properties. Metals tend to form positive ions by losing electrons, whereas non-metals typically gain electrons to form negative ions. Metals combine with oxygen to form basic oxides, while non-metals form acidic oxides. Conductivity differs, with most metals being good conductors of electricity, whereas non-metals are generally poor conductors—except graphite, which conducts electricity.

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Name of the School:	**UDISE:**
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Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Metals and Non-Metals		
		Level 1	Level 2	Level 3

Chapter 4 : Carbon and its Compounds

Activity 1 All-Rounder Carbon

35 mins

Materials Required

Pencil, Charcoal, Candle, Bulb and Battery

Instructions

- Divide the class into small groups of three or four and provide each group with a pencil, a small piece of charcoal, and a candle.
- Have students examine the texture, appearance, and feel of each material. Ask them to rub graphite and charcoal on paper to compare the smooth, clear marks made by graphite with the rough, smudged marks left by charcoal.
- Set up a simple circuit using a battery and a bulb, with a graphite pencil lead completing the connection. Observe that the bulb lights up, demonstrating graphite's ability to conduct electricity, unlike charcoal or wax, which do not.
- Light a candle and observe how the wax burns, producing heat and light due to its carbon-based compounds. In contrast, charcoal burns slowly without melting, forming ash, while graphite resists burning and requires extremely high temperatures to react.
- Ask students to fill out the observations in a table comparing graphite, charcoal, and candle wax based on their physical properties, electrical conductivity, and behaviour when exposed to heat:

Property	Graphite (Pencil Lead)	Charcoal	Candle Wax
Appearance	Gray, shiny surface	Black, dull, powdery	Translucent, soft
Texture	Smooth and slippery	Rough and brittle	Soft and waxy
Electrical Conductivity	Conducts electricity	Does not conduct	Does not conduct
Reaction to Heat	Does not melt easily	Burns and turns to ash	Melts and burns

- Discuss the observations and explain that all three substances are made of carbon atoms but arranged differently, giving them distinct physical and chemical properties.
- Highlight how carbon exists in many forms, from soft graphite used in pencils to hard diamonds, to fuels like charcoal and candle wax, making it one of the most versatile elements in nature.

Activity 2 The Naming Game

35 mins

Materials Required

Paper Slips, Marker, Chart with functional groups and naming conventions

Instructions

- Write the basic carbon chains (methane, ethane, propane, butane) on separate paper slips and ensure students understand that the number of carbon atoms determines the base name of the compound.
- Write functional groups (such as alcohol, aldehyde, ketone, carboxylic acid) on another set of slips and explain that functional groups define the properties and chemical behaviour of the compounds.
- Divide students into small groups and distribute a set of carbon chain cards and functional group cards to each group.
- Draw the following table on the board to help students reference naming conventions:

Class of Compounds	Prefix/Suffix
Haloalkane	Prefix: chloro-, bromo-
Alcohol	Suffix: -ol
Aldehyde	Suffix: -al
Ketone	Suffix: -one
Carboxylic Acid	Suffix: -oic acid
Alkene	Suffix: -ene
Alkyne	Suffix: -yne

- Instruct students to combine a carbon chain with a functional group following nomenclature rules. If the functional group's suffix starts with a vowel (like -one or -oic acid), students should remove the final 'e' from the base name before adding the suffix (e.g., propane → propanone, butane → butanol).
- Ask each group to write down their named compounds, ensuring correct spelling and modifications according to the naming rules.
- Have students present their named compounds to the class, explaining their reasoning behind the nomenclature.
- Encourage groups to identify naming patterns, such as prefixes for halogen compounds (chloropropane) and suffixes for other functional groups (propanal for aldehydes).
- Conclude the activity by discussing the importance of systematic naming in chemistry, emphasising how organic compound names allow chemists to identify and communicate molecular structures and properties effectively.

Activity 3 Cleaning Action

35 mins

Materials Required

Two transparent glasses or bowls, Water, Cooking oil, Liquid detergent, Cotton swabs

Instructions

- Fill two glasses with water.
- Add a few drops of cooking oil to both glasses and ask students to observe what happens. Guide them to notice that the oil floats on the surface and does not mix, showing that oil is hydrophobic (water-repelling).
- Explain that oily dirt behaves similarly—it doesn't dissolve in water easily, making it difficult to wash away without soap or detergent.
- Effect of Soap or Detergent
    - In one glass, add a few drops of liquid detergent or soap solution and gently stir.
    - Ask students to observe how the oil breaks into tiny droplets and starts mixing with water, demonstrating how soap emulsifies oily dirt.
    - Explain that soap molecules have two parts:
    - A hydrophobic tail, which attaches to oil and grease.
    - A hydrophilic head, which interacts with water, allowing the oil to be washed away.
- Relate this to how soaps and detergents help remove grease and stains from clothes, dishes, and skin and compare the glass with detergent to the other glass with only water, where the oil remains floating.
- Have students discuss and record their observations, noting how soap changes the interaction between oil and water.
- Relate this experiment to practical applications, such as how detergents help remove stains from clothes and how soaps cleanse the skin by breaking down oils and dirt and explain why detergents are often more effective in hard water, since they do not form scum with minerals like soap does.

Assessment

35 mins

Multiple-Choice Questions (MCQs)

1. What property of carbon allows it to form a large variety of compounds?
   a) Low reactivity
   b) Catenation and tetravalency
   c) High melting point
   d) Ability to dissolve in water
2. Covalent bonds are formed by:
   a) Transfer of electrons
   b) Sharing of electrons
   c) Loss of protons
   d) Gain of neutrons
3. Which of the following is **not** a functional group in organic compounds?
   a) Alcohol
   b) Aldehyde
   c) Ketone
   d) Sodium chloride
4. Carbon compounds are widely used as:
   a) Structural elements in metals
   b) Sources of fuels
   c) Components in ceramics
   d) Conductors in electrical circuits
5. How do soaps and detergents remove oily dirt?
   a) By dissolving oil in water directly
   b) By using hydrophobic and hydrophilic groups to emulsify dirt
   c) By reacting chemically with oil to degrade it
   d) By absorbing oil particles into their solid structure

Very Short Answer Questions

1. What is catenation?

   _____

2. Name any two carbon compounds important in daily life.

   _____

Short Answer Questions

3. Explain the difference between single, double, and triple bonds in carbon compounds.

   _____

   _____

4. What is a homologous series?

   _____

   _____

Long Answer Question

5. Discuss the significance of functional groups in organic compounds and their role in determining chemical properties.

   _____

   _____

Answer Key

1. b) Catenation and tetravalency
2. b) Sharing of electrons
3. d) Sodium chloride
4. b) Sources of fuels
5. b) By using hydrophobic and hydrophilic groups to emulsify dirt

2. Catenation is the ability of carbon to form long chains by bonding with itself.
3. Ethanol and ethanoic acid are important carbon compounds in daily life.
4. A single bond involves sharing **one** pair of electrons, a double bond involves sharing **two** pairs, and a triple bond involves sharing **three** pairs.
5. A homologous series is a group of organic compounds with the same functional group but varying chain lengths, following a uniform pattern of chemical properties.
6. Functional groups such as alcohols, aldehydes, ketones, and carboxylic acids play a crucial role in determining the chemical properties and behaviour of carbon compounds. These groups influence how a compound reacts with other substances, its solubility in different solvents, and the types of chemical transformations it can undergo. For example, alcohols are known for their ability to form hydrogen bonds, affecting their solubility in water, while carboxylic acids exhibit acidic properties due to the presence of a carboxyl group. The presence of these functional groups helps in classifying organic compounds into distinct categories and allows chemists to predict their behaviour in various chemical reactions, making them fundamental to understanding organic chemistry.

Learning Level Tracker

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Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Carbon and its Compounds		
		Level 1	Level 2	Level 3

Chapter 7 : How Organisms Reproduce

Activity 1 How Potatoes Propagate

35 mins

Materials Required

Potatoes, Knife, Tray, Moist Cotton or Tissue

Instructions

- Divide the students into small groups and begin by explaining that potatoes reproduce through vegetative propagation, a form of asexual reproduction where new plants grow from existing plant parts rather than from seeds.
- Distribute whole potatoes to each group and instruct them to carefully observe the surface, noting any small indentations or buds and add that these are the areas where new shoots can develop, asking students to describe what they see and discuss whether all potatoes have buds.
- Cut the potatoes into small pieces for them, ensuring some pieces contain buds while others do not. Have students categorise the pieces based on whether they contain buds and label them accordingly ("With Buds" and "Without Buds").
- Prepare a shallow tray with moist cotton or tissue paper to mimic soil conditions. Place the labelled potato pieces on it, ensuring those with buds are kept separate from those without.
- Keep the cotton moist by spraying it lightly with water daily. Have students observe and record changes, noting which pieces develop green shoots and roots and describing any growth patterns.
- After a week, discuss with the class:
    - *Which potato pieces produced shoots and roots?*
    - *Did the pieces without buds show any signs of growth?*
    - *Why do only the bud-containing pieces sprout new plants?*
- After the discussion, explain that potato buds contain meristematic tissue, which enables them to grow into new shoots and roots. Relate this to farming in Meghalaya, where tubers like potatoes, ginger, and turmeric are commonly propagated this way instead of using seeds, ensuring efficient crop growth in the region's hilly terrain.
- Encourage students to reflect on how a single potato can give rise to multiple new plants, demonstrating the efficiency of vegetative reproduction.

Activity 2 Flowers and Fruit

35 mins

Materials Required

Fresh flowers (Hibiscus, mustard, papaya, or any available local flowers), Magnifying glass (if available), Tweezers, White paper sheets, small brush or cotton swab, fruit with dried remnants of flowers

Instructions

- Divide the class into small groups and provide each group with a plucked flower. Instruct them to carefully identify the parts of the flower—sepals, petals, stamens, and pistil. If available, use a magnifying glass to observe the stamens (male reproductive organ) and pistil (female reproductive organ).
- Ask students to gently pluck the stamens using tweezers and tap them onto white paper to observe the pollen grains (yellowish powder). Explain that these grains contain male germ cells essential for fertilisation.
- Using a small brush or cotton swab, demonstrate the transfer of pollen grains from the stamen to the stigma of the same flower to simulate self-pollination, and then transfer pollen to the stigma of another flower to simulate cross-pollination. Discuss how similar processes occur naturally through wind, water, or pollinators like bees.
- Ask students to examine the fruit and look for remnants of dried flower parts, such as sepals or stigma, to connect the process of fertilisation to seed and fruit formation.
- Conclude the activity by discussing the importance of sexual reproduction in plants and explaining how pollination enables fertilisation, leading to the formation of seeds and fruits. Highlight that seeds ensure plant propagation, while fruits protect seeds and aid in their dispersal, supporting biodiversity and ecological balance.

Activity 3 Enacting Puberty

35 mins

Materials Required

Paper Slips for Flash Cards

Instructions

- Divide the class into small groups and give each group a set of flashcards describing changes that occur during puberty, such as "growth of facial hair," "voice deepening," "appearance of acne," "growth spurt," "getting a pimple" and “emotional changes”.
- Explain that these changes are caused by hormones like testosterone and estrogen, which become active during adolescence to prepare the body for sexual maturity and emphasise that puberty is a highly individualised process shaped by genetics, hormones, and biology, and encourage inclusive thinking by avoiding rigid classifications.

- Encourage each group to role-play the change on their flashcard and how the individual might feel and react to these changes around their peers.
- After the role-play, use the accompanying table to guide a discussion on the biological processes behind these changes, such as hormonal activation and physical development. Reinforce that these changes are a normal part of growing up and happen differently for everyone.

Process	Explanation
Hormonal Changes	The brain's hypothalamus signals the pituitary gland to release hormones (e.g., testosterone, estrogen) that trigger puberty.
Growth Spurt	Rapid increase in height and weight due to the release of growth hormones and sex hormones.
Development of Secondary Sexual Characteristics	Boys develop facial hair, deeper voices, and broader shoulders, while girls develop breasts and wider hips. Both may experience increased body hair and changes in body shape.
Changes in Skin	Increased activity of sebaceous (oil) glands and sweat glands can lead to acne and body odour.
Development of Reproductive Organs	Enlargement of the testes and penis in boys and the uterus and ovaries in girls, preparing them for reproduction.
Onset of Menstruation	In girls, the menstrual cycle begins as the ovaries release eggs and the uterus prepares for potential pregnancy.
Sperm Production	In boys, the testes begin producing sperm, enabling reproductive capability.
Emotional Changes	Hormonal fluctuations can result in mood swings, heightened emotions, and increased self-awareness.
Social and Cognitive Changes	Increased focus on identity, independence, and peer relationships, accompanied by cognitive development in critical thinking and decision-making.

- Discuss with the class how the brain initiates puberty through the hypothalamus, which signals the pituitary gland to release hormones like testosterone and estrogen. These hormones cause physical and emotional changes, including mood swings, due to fluctuations in their levels.
- Emphasise the need for self-care during puberty, including hygiene, a balanced diet, and emotional health. Encourage students to seek reliable information about their development and provide a supportive environment for open discussions about their experiences.

Assessment

35 mins

Multiple-Choice Questions (MCQs)

1. Which of the following is an example of asexual reproduction?
    a) Pollination in flowering plants
    b) Budding in Hydra
    c) Fertilisation in humans
    d) Seed formation in plants
2. What is the primary advantage of sexual reproduction over asexual reproduction?
    a) Faster reproduction rate
    b) Creation of genetic variations
    c) Requires only one parent
    d) No need for fertilisation
3. In human reproduction, fertilisation occurs in the:
    a) Uterus
    b) Ovary
    c) Fallopian tube
    d) Vagina
4. What is pollination?
    a) Transfer of sperm to the egg
    b) Division of a cell into daughter cells
    c) Transfer of pollen grains from anther to stigma
    d) Process of budding in Hydra
5. Which of the following is a method of contraception?
    a) Pollination
    b) Budding
    c) Copper-T
    d) Binary fission

Very Short Answer Questions

1. Define reproduction.

    _____

2. What is puberty?

    _____

Short Answer Questions

3. Differentiate between sexual and asexual reproduction.

    _____

    _____

4. Explain vegetative propagation with an example.

    _____

    _____

Long Answer Question

5. Describe the male and female reproductive systems in human beings.

    _____

    _____

Answer Key

2. b) Budding in Hydra
3. b) Creation of genetic variations
4. c) Fallopian tube
5. c) Transfer of pollen grains from anther to stigma
6. c) Copper-T

2. Reproduction is the biological process by which organisms produce offspring to ensure the continuation of their species.
3. Puberty is the stage of growth when an individual undergoes physical changes, such as breast development in girls and facial hair growth in boys, signalling sexual maturation.
4. Asexual reproduction involves a single parent and produces identical offspring, while sexual reproduction requires two parents and results in genetic variation.
5. Vegetative propagation is a form of asexual reproduction where new plants grow from roots, stems, or leaves. An example is the growth of new potato plants from tubers.
6. The male reproductive system includes testes, vas deferens, seminal vesicles, prostate gland, and penis, responsible for sperm production and delivery. The female reproductive system consists of ovaries, fallopian tubes, uterus, and vagina, facilitating egg production, fertilisation, and foetal development.

Learning Level Tracker

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Name of the School:	**UDISE:**
Block:	**District:**
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Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: How Do Organisms Reproduce		
		Level 1	Level 2	Level 3

Chapter 8 : Heredity

Activity 1 Family Traits Detective

35 mins

Materials Required

Notebook and pen.

Instructions

- Conduct the activity in such a way that students perform it individually.
- Begin by asking students what makes them look like their family members. Introduce the idea of "traits" as observable characteristics. Explain that traits are passed down from parents to children.
- Instruct students to think about 4-5 observable traits they have (e.g., Hair colour, eye colour, attached/ free earlobes, dimples, dominant hand, ability to roll tongue).
- Now ask them to identify which family members (parents, grandparents, siblings) also possess these traits by ticking Yes/ No under their column.
- Encourage students to make the following simple table in their notebooks:

Trait	Do I have it?	Does the mother have it?	Does the father have it?	Does sibling have it?	Do grandparents have it?
Trait 1	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No

(Note for the teacher: Guide students whenever they need your guidance.)

- Ask students to share one interesting observation from their table.
- Facilitate a brief discussion about why some traits seem to "skip" a generation or appear only in some family members.
- Write the following questions on the board and discuss them with students:
  - Did you find that you have all the same traits as your parents? Why or why not?
  - Did any traits appear in you but not in either of your parents (or vice versa)? What could be the reason for this?
  - How does this activity show that characteristics are passed down through families?
- Encourage them to share their thoughts with the whole class.
- Conclude the activity by stating that this activity introduces the concept of variations within families and sparks curiosity about the mechanisms of inheritance, laying the groundwork for understanding dominant and recessive traits later.

Activity 2 The Coin Flip Inheritance

35 mins

Materials Required

Coin, notebook, and pen

Instructions

- Conduct the activity in such a way that students perform it in pairs. Begin the activity by explaining that inheritance involves chance, similar to a coin flip.
- Introduce the idea of two "alleles" (one from each parent) determining a trait. For simplicity, we'll represent these as "Heads" (H) and "Tails" (T). We'll imagine 'H' as a dominant trait (e.g., "tall") and 'T' as a recessive trait (e.g., "short").
- Inform students that each pair of them represents a “parent” and has two coins. Instruct them to flip their coin simultaneously 10 times.
- Ask each group to record the combination in such a manner: HH, HT, TH, TT. After the 10 flips, ask them to calculate the number of each combination.
- Now, ask them to interpret the “trait”:
  - HH = Tall
  - HT = Tall (because H is dominant)
  - TH = Tall (because H is dominant)
  - TT = Short
- Ask each pair to share their results. Did everyone get the same number of “tall” and “short” offspring?
- Discuss with them why the numbers might vary. Emphasise the role of chance.
- Write the following questions on the board and discuss them with students:
  - In a coin flip game, how many “tall” offspring did you get? How many “short”?
  - Even though both “parents” (coins) had an equal chance of landing on Heads or Tails, did you always get the same number of HH, HT, TH, and TT combinations? Why or why not?
  - How does this activity help us understand why children from the same parents can have different traits?
- Encourage them to share their thoughts with the whole class.
- Conclude the activity by discussing the concept of dominant and recessive alleles and the probabilistic nature of inheritance.

  (Note for the teacher: Inform students in advance to bring these materials for the classroom activity or arrange the materials yourself if needed.)

Activity 3 Variations in Our Class

35 mins

Materials Required

Nil

Instructions

- Conduct the activity in such a way that students perform it individually.
- Begin the activity by explaining that living organisms show variations, even within the same species. Explain that these variations are crucial for survival and evolution.
- Ask the entire class to participate in a quick survey of simple, observable traits.
- For each trait, ask students to raise their hands if they possess it.
- Write the following traits on the board and mention the student's name who possesses them.
  - Attached vs. Free Earlobes: Ask students to check their earlobes (attached directly to the head vs hanging freely).
  - Tongue Rolling: Ask students if they can roll their tongue into a U-shape.
  - Hairline: Ask students to observe if they have a “widow’s peak” (V-shaped hairline) or straight hairline.
  - Hand clasping: Ask students to clasp their hands together naturally. Observe if their right thumb or left thumb is on top.

- Now look at the tallied numbers of each trait.
- Ask students: “Do all students in our class have the same type of earlobes?” or “Is everyone able to roll their tongue?”
- Discuss why there are differences in these traits among classmates, even within the same human species.
- Write the following questions on the board and discuss them with students:
  - Based on our class survey, did everyone have the same combination of traits? Why do you think this in this case?
  - What does this activity tell us about “variation” among individuals in a population?
  - Why do you think having variations within the group of living things might be important?
- Ask students to share their thoughts and consolidate the activity by discussing the concept of variation within a population. Make them understand that individuals within the same species are not identical and that these differences are a natural part of life.

Assessment

35 mins

1. If a round, green-seeded pea plant (RRyy) is crossed with a wrinkled, yellow-seeded pea plant (rrYY), the seeds produced in the **F1** generation are:
   a) Round and yellow
   b) Round and green
   c) Wrinkled and green
   d) Wrinkled and yellow
2. Humans have two different sex chromosomes, X and Y. Based on Mendel's laws, a male offspring will inherit which combination of chromosomes?
   a) Both the X chromosomes from one of its parents
   b) Both the Y chromosomes from one of its parents
   c) combination of X chromosomes from either of its parents
   d) combination of X and Y chromosomes from either of its parents.
3. Why must germ cells have only one set of genes?
   a) So they can grow faster
   b) So they can become body cells
   c) So that when they combine during reproduction, the normal number of chromosomes is restored
   d) So they can divide quickly
4. The sex hormones of two individuals are respectively denoted by XX and XY. What are the possible combinations of sex chromosomes for their female and male offsprings respectively?
   a) XX and XX
   b) XX and XY
   c) XY and XY
   d) XY and XX
5. Which of the following statements correctly distinguishes between dominant and recessive traits?
   a) Dominant traits are never expressed if a recessive allele is present.
   b) Recessive traits are more powerful and always get expressed over dominant traits.
   c) Dominant traits are expressed only when both alleles are dominant, while recessive traits are expressed when one allele is recessive.
   d) Dominant traits are expressed even if only one dominant allele is present, whereas recessive traits are expressed only when both alleles are recessive.
6. Define the following: a) Genes b) Traits
7. A man with blood group A marries a woman with blood group O, and their daughter has blood group O. Is this information enough to tell you which of the traits - blood group A or O - is dominant? Why or why not?
8. If a trait A exists in 10% of a population of an asexually reproducing species and trait B exists in 60% of the same population, which trait is likely to have arisen earlier?
9. How is the sex of the child determined in human beings?
10. Give the cross between RRYY x rryy for both F1 and F2 generation? What are the combinations of characters produced in the F2 generation.

Answer Key

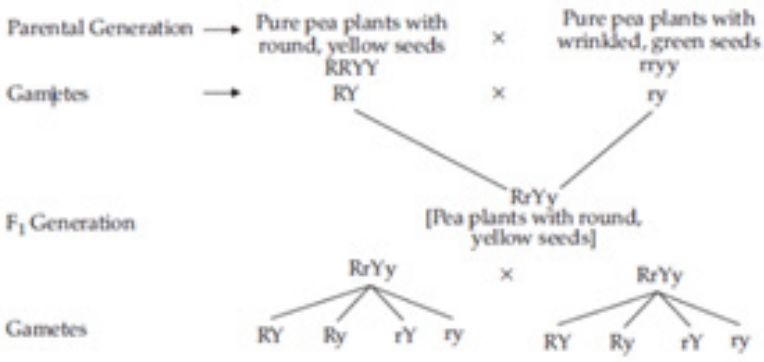
1. a) The cross between RRyy (round, green) and rrYY (wrinkled, yellow) seeds will produce RrYy (round and yellow) seeds in F1, generation, because round and yellow are dominant traits.
2. d) combination of X and Y chromosomes from either of its parents.
3. (c) So that when they combine during reproduction, the normal number of chromosomes is restored
4. b) XX and XY
5. d) Dominant traits are expressed even if only one dominant allele is present, whereas recessive traits are expressed only when both alleles are recessive.
6. a) Genes: Genes are located on chromosomes inside the nucleus of a cell.
   b) Trait: A trait is a characteristic or feature of an organism, like height or eye colour.
7. No. This information is not sufficient to determine which of the traits - blood group A or O - is dominant. This is because we do not know the blood group of all the progeny.

   Blood group A can be genotypically AA or AO. Hence, the information is incomplete to draw any such conclusion.
8. Trait B is likely to have arisen earlier than Trait A. In asexually reproducing species, genetic variations arise from small mutations or inaccuracies in DNA replication. Traits that are present in a higher percentage of the population are generally older because they have had more time to spread and become established within the population. Trait B, existing in 60% of the population, suggests it is more widespread and likely has been present for a longer period. Trait A, existing in only 10% of the population, is less common and likely more recent. Therefore, trait B is likely to have arisen earlier and had more time to proliferate in the population.
9. In humans, females have two X chromosomes and males have one X and one Y chromosome. Therefore, the females are XX and the males are XY.

   As we know, the gametes receive half of the chromosomes. The male gametes have 22 autosomes and either an X or Y sex chromosome.

   Type of male gametes: 22+X OR 22+Y.

   However, since the females have XX sex chromosomes, their gametes can only have an X sex chromosome. Type of female gamete: 22+XThus, the mother provides only X chromosomes. The sex of the baby is determined by the type of male gamete (X or Y) that fuses with the X chromosome of the female.



Gametes ⇓ ⇒	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

Learning Level Tracker

Keep a record of unit/chapter assessment results in the tracker.

As you conduct assessments based on the activities suggested, put a tick mark as per the following:

Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Heredity		
		Level 1	Level 2	Level 3

Chapter 11 : Electricity

Activity 1 Ohm's Law

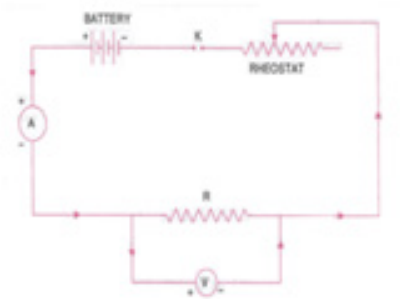
35 mins

Materials Required

Ammeter, voltmeter, a resistance, a battery, wires, a rheostat, key, and graph paper

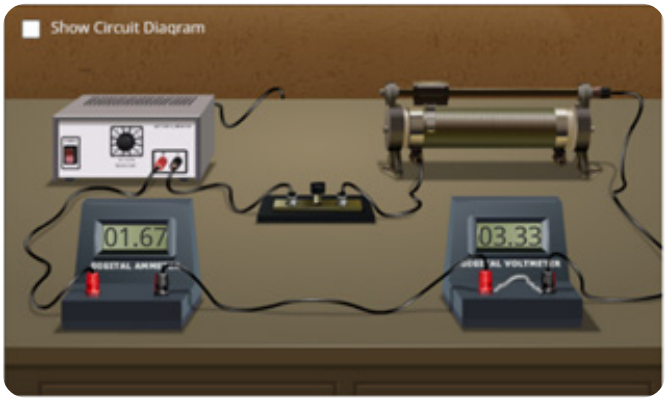
Instructions

- Divide students into small groups of 4-5.



- Draw the circuit diagram on the board.
- Demonstrate the following experiment to the students and ask them to perform the same in their groups.
- Instruct students to make the connections according to the circuit diagrams.
- Guide students to determine the least count of the voltmeter and ammeter, also note the zero error, if any.

  (Note for the teacher: Guide students wherever needed. This activity should preferably be performed in the laboratory.)
- Now ask them to insert the key, and then slide the rheostat contact and check whether the ammeter and voltmeter are working properly or not.
- Adjust the sliding contact of the rheostat such that a small current passes through the resistance coil or the resistance wire.



- Ask students to note down the value of the potential difference (V) from the voltmeter and current (I) from the ammeter.

  (Note for the teacher: You can conduct this activity as described or provide two experimental setups and let each group come and just take their readings.)
- Ask them to shift the rheostat contact slightly so that both the ammeter and voltmeter show full division readings.
- Ask them to record the readings of the voltmeter and ammeter.
- Ask students to calculate V/I for each case, which gives the resistance R of the resistor, and it is found as a constant.
- Ask them to take at least six sets of independent observations.

  (Note for the teacher: While conducting the activity, ensure that all the electrical connections are neat and tight, the voltmeter and ammeter are of proper range, and the key should be inserted only while taking readings.)
- Ask students to cut the resistance wire at the points where it leaves the terminals, stretch it, and find its length by the meter scale.
- Ask students to note down the following observations in their notebooks.

  Length of the resistance wire l =.....cm

  Least count of the given ammeter = ... A.

  Least count of the given voltmeter = ...V.

  Zero correction for the ammeter, (-e1) = ...A.

  Zero correction for voltmeter, (-e2) = ...V.

  Mean value of $\frac{V}{I}$ from observations, R = ... Ω.

$\frac{V}{I}$

- Ask them to record the reading in the given observation table.

Length of wire (cm)	**Ammeter reading (Current (I) through the wire (ampere))**	**Voltmeter reading (Potential difference (V) across the wire (volt))**	$R = \frac{V}{I}$ **(Ohm)**	**Resistance per cm of wire**
50cm	1.67 A	3.33 V	Yes/No	0.0398

- Ask students to plot a graph with I along the X-axis and V along the Y-axis using the obtained readings. The graph obtained is a straight line. This also verifies Ohm's law.
- Ask the student to calculate the value of the slope from the graph, and this value is equal to the value of R.
- Now ask students the following question: What is the nature of the graph? Is it a straight or a curved line? Share your interpretation.
- Encourage students to share their responses and consolidate the activity by discussing the following points:
  - From the activity, it is observed that the ratio $\frac{V}{I}$ remains nearly constant for each reading. The V-I graph is a straight line through the origin, indicating a direct relationship between potential difference and current.
  - Straight line graph of $\frac{V}{I}$ indicates a constant resistance.
  - The slope of the graph is equal to the resistance.
  - Discuss Ohm's law.

Activity 2 Factors Affecting Electrical Resistance

35 mins

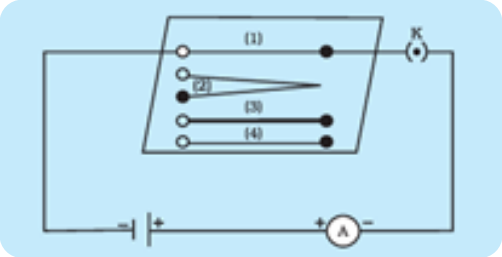
Materials Required

An electric cell, an ammeter, a nichrome and copper wire of length 'l' and '2l', and a plug key.

Instructions

- Divide students into small groups of 3-4.
- Provide them with the required materials.
- Ask them to make an electric circuit consisting of an electric cell, an ammeter, a nichrome wire of length 'l', and a plug key (assuming temperature to be constant throughout the activity).

  (Note for the teacher: Guide students wherever needed. This activity should preferably be performed in the laboratory.)
- Ask them to plug in the key and note the current in the ammeter.



- Instruct them to replace the nichrome wire with another nichrome wire of the same thickness but twice the length, that is 2l and note the ammeter reading.
- Now, guide students to replace the wire with a thicker nichrome wire of length 'l'.
- Now, inform learners that a thicker wire has a larger cross-sectional area.
- Again, ask students to note the current flowing through the circuit.
- Now, instruct students to connect a copper wire in place of a nichrome wire in the circuit. Ensure that the wire is of the same length and area of cross-section as the first nichrome wire.
- Ask students to note down their observations and tabulate the current values of cases.
- Write the following questions on the board and discuss them with the whole class:
  - Does the current depend on the length of the conductor?
  - Does the current depend on the area of the cross-section of the wire used?
- Conclude the activity by asking each group to share what they learnt from the activity.
- Consolidate the activity by discussing the following points:
  - Different materials have different resistances.
  - Resistance increases with length.
  - Resistance decreases with cross-sectional area.
  - Resistance depends on length, area, material, and temperature.

Activity 3 Glowing Wire- Seeing Heat from Electric Current

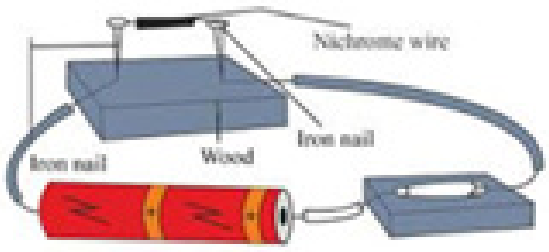
35 mins

Materials Required

3V Battery, 2 iron nails, nichrome wire (6-8 cm), thin aluminium strip, switch, connecting wires with alligator clips, wooden base board.

Instructions

- Divide students into small groups of 4-5.



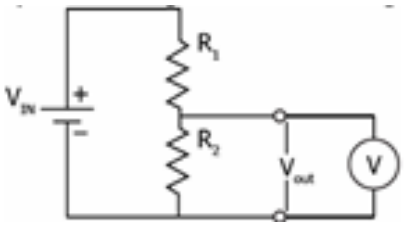
- Draw the circuit diagram on the board.
- Demonstrate the following experiment to the students and ask them to perform the same in their groups.
- Instruct students to make the connections according to the diagrams.
- Ask them to first fix iron nails vertically on a base at short distance.
- Ask them to secure a strip of aluminium foil between the nails (tight and flat).
- Now, ask them to connect the nails to the battery and switch using wires, forming a closed circuit with aluminium foil acting as the resistance.
- Ask them to ensure that all the connections are tight.
- Ask students to close the switch for a few seconds and observe the foil.

  (Note for the teacher: Guide students wherever needed. Ensure student safety while conducting the activity.)
- Ask them to turn off the switch and repeat the same procedure by replacing the foil with a nichrome wire of the same length.
- Ask students to close the switch again and observe the nichrome wire.
- Ask students to record the observations and infer the reason behind the differences.
- Ask students to share their observations and consolidate the activity by discussing the following points:
  - Explain the heating effect of current.
  - Discuss: Aluminium foil shows little to no heating.
  - Nichrome wire heats up and possibly glows due to higher resistance.
  - Discuss that the heating effect of electric current is greater in materials with higher resistance. Nichrome, having higher resistance than aluminium, converts more electrical energy into heat, which is why it is used in heating appliances

Assessment

35 mins

1. The image shows a circuit diagram

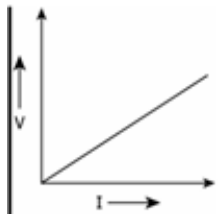


What is being measured using the voltmeter?

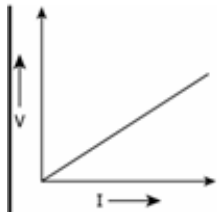
a) Current in the circuit
b) Voltage in the circuit
c) Voltage across the resistor R_2
d) Resistance offered by the resistor

2. Which plot shows the change in voltage when the current is gradually decreased across a resistor?

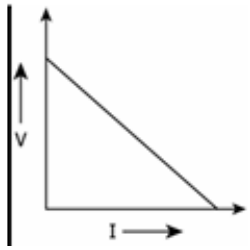
(a)



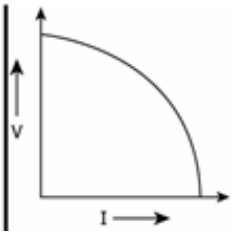
(b)



(c)



(d)



3. Which combination of 2 Ω resistors and 4 Ω resistors offers the least resistance to current in the circuit?

a) Series combination, which results in a net resistance of 2 Ω.
b) Parallel combination, which results in a net resistance of 2 Ω.
c) Series combination, which results in a net resistance of 1.3 Ω.
d) Parallel combination, which results in a net resistance of 1.3 Ω.

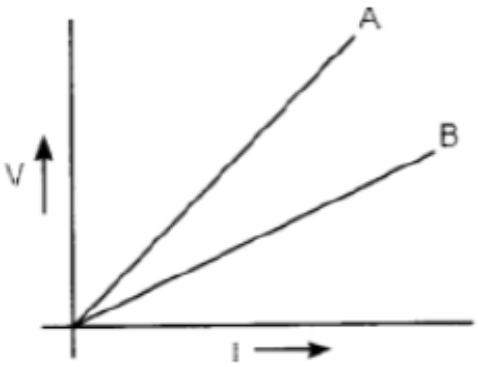
4. How much more heat is produced if the current is doubled?

a) twice the original amount
b) thrice the original amount
c) four times the original amount
d) Five times the original amount

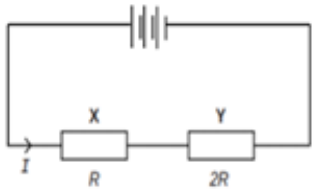
5. A bulb has a resistance of 5 Ω. If 2 A of current at 200 V flows through the bulb, how much heat is produced by the bulb in 10 minutes?

a) 200 J
b) 2400 J
c) 6000 J
d) 12000 J

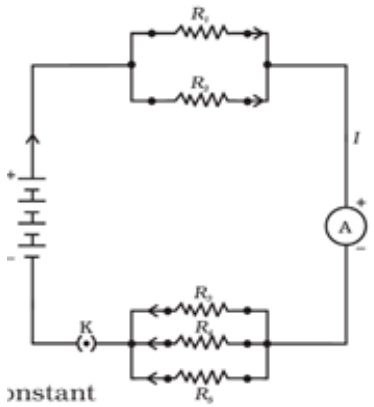
6. An electric refrigerator rated 400 W operates 8 hours/day. What is the cost of the energy to operate it for 30 days at Rs 3.00 per kWh?
7. The V-I graph for two wires A and B is shown in the figure. If both wires are of the same length and thickness, which of the two is made of a material of high resistivity? Give justification for your answer.



8. An electric iron consumes energy at a rate of 840 W when heating is at the maximum rate and 360 W when the heating is at the minimum. The voltage is 220 V. What are the current and the resistance in each case?
9. The figure shows two resistors, X and Y, connected in series to a battery. The power dissipated for this combination is P1. When these resistors are connected in parallel to the same battery, then the power dissipated is given by P2. Find out the ratio $P1/P2$.



10. If in Fig. 11.12, R1 = 10 Ω, R2 = 40 Ω, R3 = 30 Ω, R4 = 20 Ω, R5 = 60 Ω, and a 12 V battery is connected to the arrangement. Calculate
    (a) The total resistance in the circuit, and
    (b) The total current flowing in the circuit.



Answer Key

1. c) Voltage across the resistor R2
2. c) The correct plot is (c), which shows a linear decrease in voltage (V) as the current (I) decreases.
3. d) Parallel combination, which results in a net resistance of 1.3 Ω.
4. c) four times the original amount as H = I2Rt
5. d) 12000 J

   Resistance of bulb is 2 Ω.

   The current flowing through the bulb is 2A

   The time is 10 minutes = 60 × 10 = 600 seconds

   H = I2Rt

   = (2)2 × 5 ×600

   H = 4 × 5 × 600

   H = 12000 J
6. The total energy consumed by the refrigerator in 30 days would be

   400 W × 8.0 hour/day × 30 days = 96000 W h

   = 96 kW h

   Thus, the cost of energy to operate the refrigerator for 30 days is 96 kW h × Rs 3.00 per kW h = Rs 288.00
7. The V-I graph for wires A and B shows the relationship between voltage (V) and current (I) for both wires. Since both wires have the same length and thickness, the material's resistivity will determine their electrical behaviour.

   From the graph:

   - The slope of the V-I graph represents resistance (R) since $R = \frac{V}{I}$
   - Wire A has a steeper slope than wire B, indicating that wire A has a higher resistance.

     Since resistance depends on resistivity [R = ρ(l/A)], and both wires have the same length and cross-sectional area, the difference in resistance must come from their material's resistivity ρ. Wire A is made of a material with higher resistivity than wire B because its resistance is higher, which is evident from its steeper slope on the V-I graph.
8. P = V I

   $I = \frac{P}{V}$

   a) When heating is at the maximum rate,

   $I = \frac{840\ W}{220\ V} = 3.82\ A$;

   and the resistance of the electric iron is

   $R = \frac{V}{I} = \frac{220\ V}{3.82\ A} = 57.60\ \Omega$.

   b) When heating is at the minimum rate, I = 360 W/220 V = 1.64 A;

   and the resistance of the electric iron is

   $R = \frac{V}{I} = \frac{220\ V}{1.64\ A} = 134.15\ \Omega$.
9. Given that the resistance of X is R and the resistance of Y is 2R.

   Or the series combination, the equivalent resistance is $R_s = R + 2R = 3R$.

   The power dissipated in the series combination is $P1 = \frac{V^2}{R_s} = \frac{V^2}{3R}$

For the parallel combination, the equivalent resistance is $\frac{1}{R_p} = \frac{1}{R} + \frac{1}{2R}$

$R_p = \frac{2R}{3}$

The power dissipated in the parallel combination is $P_2 = \frac{V^2}{R_p} = \frac{V^2}{\frac{2R}{3}} = \frac{3V^2}{2R}$

The ratio of the power dissipated in the series combination to the power dissipated in the parallel combination is $\frac{P1}{P2} = \frac{\frac{V^2}{3R}}{\frac{3V^2}{2R}} = \frac{2}{9}$

10. Suppose we replace the parallel resistors R1 and R2 by an equivalent resistor of resistance, R'. Similarly, we replace the parallel resistors R3, R4, and R5 by an equivalent single resistor of resistance R''.

$\frac{1}{R'} = \frac{1}{10} + \frac{1}{40}$

R' = 8 Ω.

$\frac{1}{R''} = \frac{1}{30} + \frac{1}{20} + \frac{1}{60}$

R'' = 10 Ω.

Thus, the total resistance, R = R' + R'' = 18 Ω.

To calculate the current, we use Ohm's law, and get I = V/R = 12 V/18 Ω = 0.67 A.

Thus, the total current, I = 0.67 A.

Learning Level Tracker

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Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Electricity		
		Level 1	Level 2	Level 3

Chapter 12 : Magnetic Effects of Electric Current

Activity 1 Mapping Magnetic Fields: Visualising the Invisible

35 mins

Materials Required

Bar magnet, iron fillings, white sheet, tape

Instructions

- Divide students into small groups of 3-4. Provide each group with a bar magnet and iron filings.
- Ask students to fix the white sheet using tape.
- Instruct students to carefully place the bar magnet in the centre of the paper.
- Now ask them to gently and uniformly sprinkle a small amount of iron filings around the bar magnet.
- Ask them to gently tap the drawing board a few times.
- Ask students to closely observe the pattern formed by the iron fillings and discuss their observations with their group members.
- Write the following questions on the board and discuss them with students.
  - Why do the iron filings arrange themselves in this specific pattern around the magnet?
  - What does the observed pattern of the iron filings indicate about the area around the magnet?
  - Based on your observations, how would you describe the concept of a “magnetic field”?
  - Can you think of any other ways to visualise or detect magnetic fields?

  (Note for the teacher: Supervise students closely during this activity to ensure safe handling of iron filings and prevent inhalation or scattering. Emphasise not touching the iron filings directly.)
- Accept responses and encourage peer explanation among students.
- End the activity by discussing whether their observations accurately represent the magnetic field lines.
- Explain that the density of the iron filings indicates the strength of the magnetic field at different points.

Activity 2 Seeing the Invisible

35 mins

Materials Required

Thick copper wire (about 20-30 cm long), rectangular cardboard, iron fillings, two 1.5V dry cells, connecting wires, plug key, rheostat, ammeter, and compass.

Instructions

- Divide students into small groups of 3-4.
- Make a small hole at the centre of the cardboard and insert the copper wire vertically through it so that it stands upright (normal to the surface).
- Fix the cardboard securely so it doesn't move.
- Connect the copper wire to a circuit including battery, plug key, ammeter, and rheostat. (Refer to the textbook diagram for guidance.)
- Sprinkle iron filings evenly over the cardboard.
- Now, explain the Right-Hand Thumb Rule (Before switching on the current).
- Ask students to show their right hand in a thumbs-up gesture.
  - Thumb: Direction of the current (upward or downward in the wire)
  - Curled fingers: Direction of the magnetic field around the wire.
- Set the rheostat to a fixed position.
- Close the key to allow current to flow through the wire. Note the current on the wire.
- Ask students to observe and describe what they see.
- Now, reverse the terminals of the battery to change the current direction.
- Repeat the tapping and observation process.
- Ask students to notice how the iron filings' pattern remains the same, but the compass needle direction changes, showing reversal of the magnetic field direction.
- Write the following questions on the board and discuss them with students:
  - What happens to the iron filings when current passes through the wire?
  - How does reversing the current affect the magnetic field direction?
  - Why are the iron filings forming circular patterns?
  - How does the right-hand thumb rule help us understand the pattern?
- Conclude the activity by discussing the following points:
  - The magnetic field around a current-carrying straight conductor forms concentric circles, and the direction of this field depends on the direction of the current, as shown by the Right-Hand Thumb Rule.
  - Reversing the current also reverses the direction of the magnetic field, which is visible by the change in compass needle orientation.

  (Note for the teacher: You may demonstrate the activity to the class while actively involving students in observation and discussion. If all materials are available, encourage students to perform the activity themselves in small groups under your guidance.)

Activity 3 Magnetic Field Pattern in a Current-Carrying Circular Coil

35 mins

Materials Required

Rectangular cardboard with two small holes, a circular coil with many turns of insulated copper wire, a battery, a plug key, iron fillings, and connecting wires.

Instructions

- Divide the students into small groups of 3-4.
- Take a piece of cardboard and make two holes at an equal distance from the centre.
- Insert a circular coil (with many turns of insulated copper wire) through these holes so that:
  - Half of the coil is above the cardboard.
  - The other half remains below the cardboard.
- Connect the two ends of the coil to a battery and plug the key in series using connecting wires.
- Evenly sprinkle iron filings over the cardboard, especially in the area around the coil.
- Close the key to allow current to pass through the coil.
- Gently tap the cardboard without disturbing the coil.
- Ask students to observe the pattern formed by the iron filings and share what they see.
- Write the following questions on the board and discuss them with students:
  - What is the shape of the pattern formed by the iron fillings?
  - Are the filings concentrated at any specific points?
  - What does this tell you about the magnetic field created by the coil?
- Conclude the activity by discussing the following points:
  - Magnetic field due to current in a circular coil: The iron filings form a circular pattern showing how the field lines pass through the centre and loop around the coil.
  - Electromagnet formation: When current passes through the coil, it behaves like a magnet — this is how an electromagnet works.
  - Strength of the magnetic field: The field is stronger inside the coil, especially when the number of turns or the current is increased.
  - Uses of solenoids and coils: In daily life, solenoids are used in electric bells, motors, magnetic locks, and speakers.

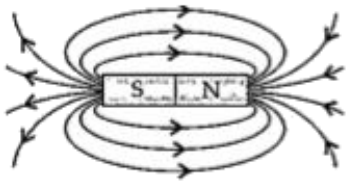
  (Note for the teacher: You may demonstrate the activity to the class while actively involving students in observation and discussion. If all materials are available, encourage students to perform the activity themselves in small groups under your guidance.)

Assessment

35 mins

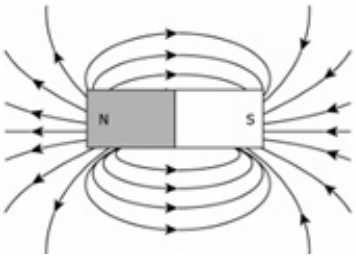
1. A student learns that the magnetic field strength around a bar magnet is different at every point. Which diagram shows the correct magnetic field lines around a bar magnet?

(a)

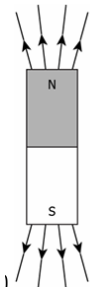


(b)

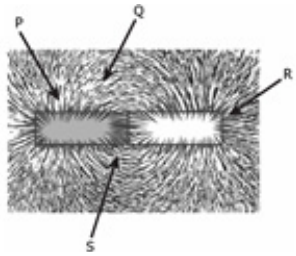
(c)



(d)



2. A student places some iron filings around a magnet. The iron filings arrange themselves as shown in the image.

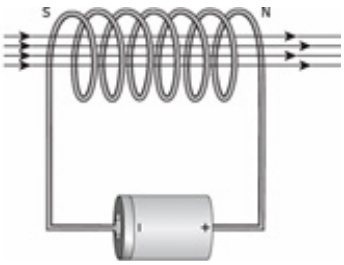


The student labelled four different regions around the magnet. Where would the magnetic field be strongest?

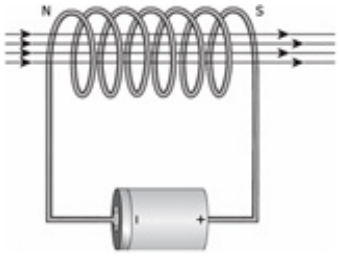
a) P
b) Q
c) R
d) S

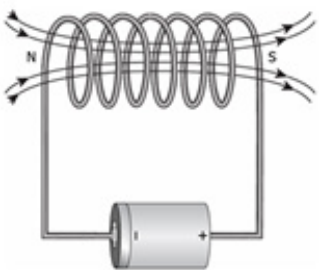
3. The magnetic field lines of a solenoid are similar to the magnetic field lines of a bar magnet. Which image correctly shows the solenoid as a bar magnet?

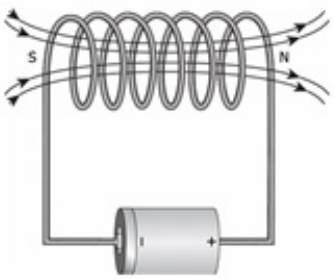
a)



b)

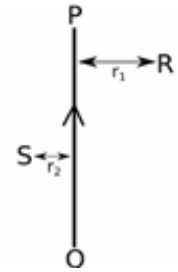


c) 

d) 

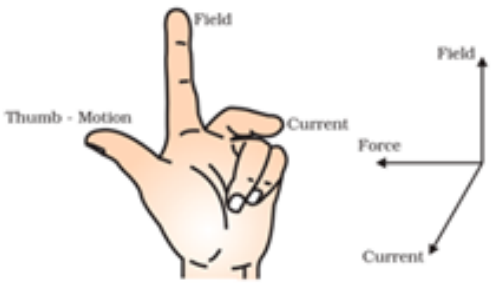
4. Appliances that have a metal body are generally connected to the earthing wire. What is the reason for these wires?
   (a) to prevent an excess of current
   (b) to prevent the leakage of current
   (c) to provide extra current to the appliance
   (d) to provide high resistance to the appliance
5. Which physical quantities is indicated by the direction of thumb in Fleming's left-hand rule.
   (a) Field
   (b) Motion
   (c) Current
   (d) Voltage
6. How is the strength of the magnetic field near a straight current conductor
   (i) Related to the strength of the current in the conductor?
   (ii) Is it affected by changing the direction of the flow of current in the conductor?
7. Magnetic field lines of two magnets are shown in Figure. A and a figure. B.

   Select the figure that represents the correct pattern of field lines. Give reasons for your answer. Also, name the poles of the magnets facing each other.
8. PQ is a current-carrying conductor in the plane of the paper as shown in the figure below.



   (i) Find the directions of the magnetic fields produced by it at points R and S.
   (ii) Given r1> r2, where will the strength of the magnetic field be larger? Give reasons.
9. What are magnetic field lines? List any two characteristics of field lines. Draw the pattern of magnetic field lines due to a current-carrying circular loop.
10. Draw an appropriate schematic diagram showing common domestic circuits and discuss the importance of a fuse. Why is it that a burnout fuse should be replaced by another fuse of identical rating?

Answer Key

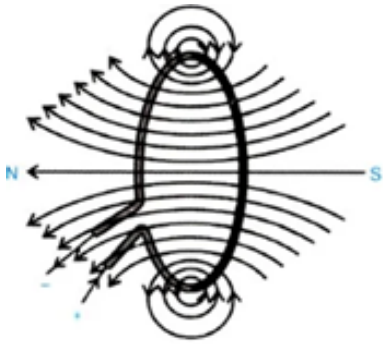
1. c)
2. c) R
2. d)
3. b) to prevent the leakage of current
4. (b) Motion
5. 

Fleming's left-hand rule

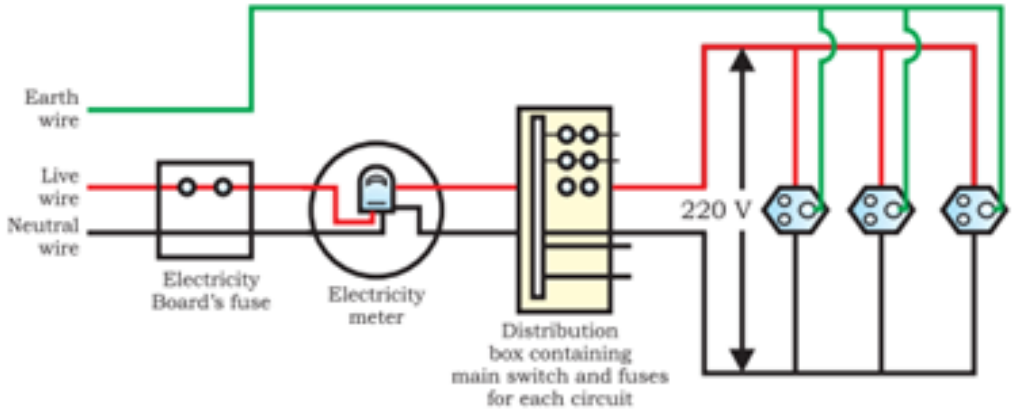
6. (i) The strength of the magnetic field around a straight current conductor increases on increasing the strength of the current in the conductor increases or vice versa.
   (ii) The direction of the magnetic field around a straight current-carrying conductor gets reversed if the direction of current through that conductor is reversed.
7. Figure B represents the correct pattern of field lines. In Figure A, field lines cross each other, which is not possible because if they cross each other, at the point of intersection, there would be two directions of field lines. In figure B, field lines are emerging in nature, so the poles of the magnet facing each other are north poles, while opposite faces will have south polarity.
8. i) At point R, the magnetic field direction is into the plane of the paper. At point S, the magnetic field direction is out of the plane of the paper.
   ii) The right-hand grip rule is used to find the direction of the magnetic field for a straight current-carrying conductor.
9. A magnetic field line is the path along which a free north pole tends to move.

   Characteristics of magnetic field lines are:

   (a) Outside a magnet, the magnetic field lines are directed from the N-pole of the magnet towards the S-pole. However, inside a magnetic field, lines are directed from the S-pole to the N-pole.
   (b) The relative strength of magnetic field lines is given by the degree of closeness of the field lines. More crowded field lines mean a stronger field.
   (c) No two magnetic field lines can ever intersect each other



10.



A fuse in a circuit prevents damage to the appliances and the circuit due to overloading. Otherwise, the appliances or the circuit may be damaged.

When current in the circuit exceeds the value of fuse rating, the fuse wire burns due to overloading. This causes a gap in the circuit and the current stops flowing in the circuit.

This is done due to the reason so that the circuit or the appliances to be connected in the circuit continue functioning without any damage in future.

Learning Level Tracker

Keep a record of unit/chapter assessment results in the tracker.

As you conduct assessments based on the activities suggested, put a tick mark as per the following:

Level 1: Not able to solve problems and having difficulty comprehending the problem

Level 2: Solves most of the problems with external support

Level 3: Solves problems independently

Name of the School:	**UDISE:**
Block:	**District:**
Name of the Teacher:	**Assessment Date:**

Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Magnetic Effects of Electric Current		
		Level 1	Level 2	Level 3

Chapter 13 : Our Environment

Activity 1 Mini Ecosystem in a Jar

35 mins

Materials Required

A large, clear glass jar with a lid, small pebbles or gravel, garden soil, and small, hardy plants (small ferns or even seeds that sprout quickly). Spray bottle, spoon and gloves.

Instructions

- Divide students into small groups of 3-4. Provide each group with the materials required.
- Instruct students to clean the glass jar thoroughly. Now ask them to place the layer of pebbles or gravel (about 1-2 inches deep) at the bottom of the jar.

  (Note for the teacher: Guide students wherever they need your assistance.)
- Ask them to add a layer of soil (about 3-4 inches deep) on top of the gravel. Create small depressions for planting.
- Ask them to carefully plant your chosen small plants into the soil.
- Inform them that they can use a spoon or their fingers to make small holes and gently place the roots.
- Tell them to lightly mist the plants and soil with water using the spray bottle until the soil is damp but not soggy.
- Ask them to seal the jar and place it in indirect sunlight to avoid direct sunlight, as it can overheat the jar.
- Ask students to observe the mini ecosystem over several days and note changes in plant growth and moisture levels.

  (Note for the teacher: Present a pre-prepared mini ecosystem to the students, allowing them to observe and analyse the gradual changes occurring over several days.)
- Encourage them to document their observation, discuss patterns, and reflect on the interactions within an ecosystem to deepen their understanding of environmental dynamics.
- Encourage each group to show their mini ecosystem to the whole class.
- Conclude the activity by discussing the ecosystem and its components with students.

Activity 2 Flow of Energy in a Food Chain

35 mins

Materials Required

- Chits with organism names (Sun, Grass, Grasshopper, Frog, Snake, Eagle).
- Labels for each role (Producer, primary consumer, etc.)
- Tissue paper or Newspaper

Instructions

- Divide students into small groups of 4. Each group will represent a complete food chain, like this:

  Sun → Producer (Grass) → Primary Consumer (Grasshopper) → Secondary Consumer (Frog) → Tertiary Consumer (Snake/Eagle)

  (Note for the teacher: Use different food chains for different groups. Ask students to think about different food chains for performing the activity.)
- Now, each group will act out the flow of energy using the paper. It represents the total energy received from the Sun.
- Hand one tissue paper to the first student in each group (the Sun).
- Now ask the student acting as the Sun to pass its energy to the producer (Grass) by giving them the paper.
- Now, ask the student acting like a Primary consumer to tear a part of the paper from the hand of the producer.
- Again, instruct the third student acting like a Secondary consumer to do the same — tear a smaller part from what is left.
- Now, ask the student acting like a Tertiary Consumer, tear a small piece from whatever is remaining.

  (Note for the teacher: Inform students that at the end, every group member should hold up the piece of tissue they have.)
- Ask each student in the group to show the piece of paper they are holding at the end of the activity.
- Write the following questions on the board and discuss them with the whole class:
  - Who had the largest piece of the paper? Why?
  - Who had the smallest piece of paper? What does that tell us about energy availability?
  - Why can't food chains have too many steps?
  - What would happen if we lost the producers?
  - How can humans help maintain balance in food chains?
- Conclude the activity by stating that only a small fraction of energy gets passed on at each level of the food chain. Most of it is used up or lost as heat. That's why we need more plants and fewer top predators in an ecosystem. The flow of energy is never 100% efficient, and that's why food chains are usually short.

  (Note for the teacher: Arrange the materials needed for the activity in advance.)

Activity 3 Shield or leak? – Understanding Ozone Layer Depletion

35 mins

Materials Required

Transparent plastic container, water, blue food colouring, a piece of black chart paper, scissors, a torch, and a white sheet.

Instructions

- Divide students into small groups of 4-5. Ask students to take the transparent container and place it on the table.
- Instruct students to carefully fill the container about three-fourths with clean water.
- Add 3-4 drops of blue food colouring into the water of each group's container. Ask the student to gently stir it with a spoon. This coloured water represents Earth's atmosphere.
- Ask them to take a piece of black chart paper. This will represent the ozone layer.
- Ask them to carefully use scissors to make a few small holes randomly in the chart paper. These holes represent the damaged parts of the ozone layer.

  (Note for teacher: Ensure student safety while they are using scissors in the activity.)
- Now ask students to place the black chart paper flat across the top of your container. If the paper is too small, guide them to tape the sides gently so it stays in place.
- Ask students to turn on their torch and hold it above the paper, and shine the light directly downward.

  (Note for the teacher: If individual torches are unavailable for each group, provide a single torch and instruct students to take turns using it, ensuring that every group gets an opportunity to complete the step effectively.)
- Ask them to observe what happens: where does the light go through? Where is it blocked?
- Write the following questions on the board and discuss them with the whole class:
  - What do you see when the light passes through the holes?
  - What do the holes in the black paper represent?
  - What does the torch light or torch represent?
  - Why is light not passing through the rest of the paper?
  - How is this model similar to what happens in the real environment?
- Accept responses and clear misconceptions of students by stating that this activity shows that the ozone layer blocks harmful rays from reaching us. The flashlight represents UV rays from the sun. Where the ozone layer is intact (black paper), it blocks the rays. But where there are holes, the rays reach Earth, just like in real life. We must protect the ozone layer by avoiding harmful chemicals like CFCs and using environmentally friendly alternatives.

Assessment

35 mins

1. Which of the following groups contains only biodegradable items?
   a) Cake, wood, and glass
   b) Grass, wood, and plastic
   c) Glass, flowers, and leather
   d) Fruit-peels, cake, and lime juice.
2. What will happen if a deer is missing in the food chain given below?
   Grass → Deer → Tiger
   a) The population of tiger decreases, and the population of grass increases
   b) The population of grass decreases
   c) The population of tiger increases
   d) The tiger will start eating grass.
3. Which of the following are environment-friendly practices?
   a) Walking to school instead of getting your mother to drop you off on her scooter
   b) Carrying cloth bags to put purchases in while shopping
   c) Switching off unnecessary lights and fans
   d) All of the above
4. In an ecosystem, 10% of the energy is available for transfer from one
   trophic level to the next is in the form of:
   a) heat energy
   b) light energy
   c) chemical energy
   d) mechanical energy
5. The manufacturing of Chlorofluorocarbons-free refrigerators is mandatory throughout the world. How does this help prevent ozone depletion?
   a) This will help convert oxygen molecules into ozone.
   b) This will help convert the CFCs into ozone molecules.
   c) This will reduce the production of CFC from oxygen molecules.
   d) This will reduce the release of CFCs that react with ozone molecules.
6. In a terrestrial ecosystem, what percentage of the sunlight energy that falls on green plants is captured and converted into food energy?
7. Explain the role of decomposers in the environment.
8. What is biological magnification? Will the levels of this magnification be different at different levels of the ecosystem?
9. Name the wastes that are generated in your house daily. What measures would you take for their disposal?
10. Why is damage to the ozone layer a cause for concern? What steps are being taken to limit this damage?

Answer Key

1. d) Fruit-peels, cake, and lime juice.
2. a) The population of tiger decreases, and the population of grass increases
3. d) All of the above
4. c) Chemical energy.
5. d) This will reduce the release of CFCs that react with ozone molecules.
6. Energy flow in an ecosystem is unidirectional. Energy always flows from the sun to the producers and then to the consumers. The green plants in a terrestrial ecosystem capture about 1% of the energy of sunlight that falls on their leaves and convert it into food energy.
7. Decomposer break down the dead and decaying living matter and helps in the nutrient recycling. This will clean the environment by removing dead material.
8. Biological magnification is defined as the phenomenon of accumulation or increase in the concentration of some toxic substances at each trophic level. The levels of biomagnification will be different at different trophic levels. For example, in a pond of water, DDT was sprayed, and the producers were found to have a 0.04 ppm concentration of DDT. Since many types of planktons are eaten by some fish and clams, their body accumulates 0.23 ppm of DDT. A seagull that feeds on clams accumulates more DDT as one seagull eats many clams. Hawk, the top carnivore, has the highest concentration of DDT.
9. Wastes generated in our house daily are as follows:
   a) kitchen waste
   b) paper waste like newspapers, bags, and envelopes
   c) plastic bags, milk pouches
   d) vegetable/fruit peels/rind measures for disposal.

   Measures to take to dispose of house waste are:
   a) Separation into biodegradable and non-biodegradable, recyclable and non-recyclable wastes.
   b) Recyclable wastes (wastepaper, material, polythene or plastic baggage, cartons, bottles, cans, and many others) can, in reality, receive rag pickers for recycling, which really in all fairness, is considerable.
   c) Vegetable/fruit peels can be placed near trees/ plants, which on decomposition, will enrich the soil with nutrients.
10. The damage to the ozone layer is a cause for concern because:
    a) It causes skin darkening, skin cancer, ageing, and corneal cataracts in human beings.
    b) It can result in the death of many phytoplankton, which leads to increased global warming.

    To limit the damage to the ozone layer, the release of CFCs into the atmosphere must be reduced. CFCs used as refrigerants and in fire extinguishers should be replaced with environmentally safe alternatives. Also, the release of CFCs through industrial activities should be controlled.

Learning Level Tracker

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Class: 10		Subject: Science		
Roll No.	Name of the Student	Chapter: Our Environment		
		Level 1	Level 2	Level 3

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