ITL PUBLIC SCHOOL

Active Engagement of Young Minds during summer vacations 2026

Class XII

BIOLOGY

Summer vacations provide an excellent opportunity for students to learn beyond textbooks and explore the practical applications of Biology in everyday life. Biology in Grade 12 focuses on advanced concepts related to human welfare, genetics, biotechnology, ecology, and health sciences. This holiday homework has been designed to strengthen scientific understanding, research aptitude, creativity, and analytical skills in accordance with the CBSE curriculum.

The assignment emphasizes investigatory learning, where students will observe, analyze, collect data, and draw conclusions scientifically. To prepare students for modern scientific practices, this homework also integrates Computational Thinking and Artificial Intelligence (AI) tools. Students will learn how AI and digital technologies are increasingly used in biological research, healthcare, environmental studies, and biotechnology.

Instructions for Students

1. Design your project using apps like **Canva** for creating presentations, **Google Docs** for writing the report, and **Lab4Biology** or Embibe for virtual experiments and data collection
2. Include relevant diagrams, photographs, charts, data tables, and references.
3. Computational Thinking and AI tools must be used ethically and meaningfully.
4. Submission should include:
    a. Written report
    b. Data analysis
    c. AI-assisted observations
    d. Conclusion and bibliography

Assessment Criteria - Content Accuracy, Creativity & Presentation , Research & Analysis, AI & Computational Thinking Integration, Viva/Explanation

<u>Part A – Investigatory Project</u>

Students must prepare ONE investigatory project integrating:

- Biological concepts
- Computational Thinking
- Artificial Intelligence tools
- The project must strictly follow the CBSE investigatory project format given below.

Steps of Investigatory Project

1. Title of the Project-Choose a clear and relevant title.

2. Certificate -A certificate signed by the teacher

3. Acknowledgement-Write a brief acknowledgement thanking teachers, parents, and guides.

4. Index-List all topics with page numbers.

5. Introduction-Brief explanation of the topic and its biological importance.

6. Aim/Objectives-Clearly state the purpose of the investigation.

7. Hypothesis-Write a possible prediction or assumption related to the study.

8. Materials Required -List all apparatus, tools, software, survey sheets, etc.

9. Methodology/Procedure -Step-by-step explanation of how the investigation was conducted.

10. Data Collection Include:

- Tables
- Survey results
- Observations
- Measurements
- Images/graphs

11. Computational Thinking Integration

Students should demonstrate:

- Pattern recognition
- Logical sequencing
- Data organization
- Graphical analysis
- Comparison and interpretation

12. AI Integration

Mention how AI tools were used for:

- Data analysis
- Graph generation
- Prediction
- Research assistance
- Image recognition
- Report presentation

13. Observations and Analysis-Interpret collected data using biological reasoning.

14. Result/Conclusion-Write the final findings of the investigation.

15. Precautions-Mention safety measures and limitations.

16. Bibliography-Include books, websites, journals, and AI tools referred to.

Suggested AI Tools

Students may use:

- OpenAI – ChatGPT
- Google – Google Gemini
- Canva AI Tools
- Google Sheets AI Features
- Teachable Machine by Google

Examples of Investigatory Projects

Project Example 1

"AI-Assisted Analysis of Lifestyle Habits and Their Impact on Student Health"

Biological Concepts

- Human Health and Disease
- Nutrition
- Biological Rhythms
- Public Health

Aim

To investigate the effect of sleep patterns, screen time, exercise, and eating habits on student health.

Hypothesis

Students with balanced lifestyle habits show better physical and mental health indicators.

Methodology

- Conduct a survey among 25–30 students.
- Collect data on:
    - Sleep duration
    - Screen time
    - Physical activity
    - Water intake
    - Junk food consumption
- Organize responses in tables.

Computational Thinking Used

- Classification of responses
- Pattern recognition
- Data comparison
- Statistical interpretation

AI Integration

Students may use AI tools to:

- Generate graphs automatically
- Identify trends

- Summarize survey findings
- Predict possible health impacts

Expected Outcome

Students understand how lifestyle choices affect biological health and how AI helps in health-data analysis.

Project Example 2

"Study of Water Quality and Microbial Growth in Different Water Samples Using AI-Based Data Analysis"

Biological Concepts

- Microorganisms
- Environmental Biology
- Human Welfare
- Water Pollution

Aim

To compare different water samples for cleanliness and possible microbial contamination.

Hypothesis

Untreated or stagnant water contains higher microbial growth than filtered water.

Materials Required

- Water samples
- Glass containers
- Microscope (if available)
- Observation sheets
- Mobile camera
- AI analysis tools

Methodology

- Collect samples from:
    - Tap water
    - RO water
    - Pond water
    - Stored water
- Observe odor, color, sedimentation, and microbial presence.
- Record observations for several days.

Computational Thinking Used

- Observation classification

- Comparative analysis
- Data recording
- Pattern identification

AI Integration

Students may:
- Use AI image tools for identifying microbial patterns
- Create graphs and comparison charts
- Analyze trends using spreadsheet AI features

Expected Outcome

Students understand water hygiene, microbial contamination, and technological applications in environmental biology.

PART-B Subject Enrichment Work

1. Chapter-Based Concept Maps

Prepare detailed flowcharts/concept maps for the following chapters:
- Sexual Reproduction in Flowering Plants
- Human Reproduction
- Genetics and Evolution

2. Biology and Society Activity

Prepare a 2–3 page report on any ONE topic:

- Role of Biotechnology in Medicine
- Organ Donation Awareness
- Climate Change and Biodiversity
- AI Applications in Healthcare
- Genetic Disorders and Their Prevention

It should include:
- Introduction
- Biological significance
- Recent developments
- Conclusion

Part C –Practicle file as discussed in class.

Submission Date

Submit the complete holiday homework in the first week after summer vacations.

"Biology is not just about memorizing facts; it is about understanding life through observation, analysis, and innovation."