

Class XI – SCIENCE STREAM

Holiday Homework 2026

Dear Students,

Learning becomes more meaningful when it goes beyond textbooks and classrooms. With this objective, the Holiday Homework has been designed to encourage observation, creativity, research, teamwork, and independent thinking.

It comprises two important sections, and students are expected to complete both sections compulsorily.

PART I – Integrated Group Project

This section provides an opportunity to work collaboratively, exchange ideas, and develop innovative solutions related to sustainable development through interdisciplinary learning.

PHYSICS, CHEMISTRY, BIOLOGY, BIOTECHNOLOGY & COMPUTER SCIENCE



What is Sustainable Development?

The term sustainable development refers to meeting the needs of the present without compromising the ability of future generations to meet their own needs. It focuses on the balanced use of natural resources, environmental protection, and social well-being.

Sustainable development helps us understand how to conserve energy, reduce pollution, manage waste, and use resources wisely. It plays an important role in solving global problems such as climate change, deforestation, and environmental degradation, ensuring a safer and healthier future for all.



PART 1 - Volunteers of Sustainable Development: Building a Better Future

Sustainable development is not just about awareness—it is about action. In today’s world, individuals play a key role in protecting the environment and promoting sustainable living. Through this project, students will become active participants in creating solutions for real-life environmental challenges.

This project integrates concepts from Physics, Chemistry, Biology, Biotechnology, and Computer Science to help students explore how science and technology can contribute to sustainable development and improve the quality of life.

Group Project (To be done in groups of 5 students):

Volunteers of Sustainable Development

Task 1: Survey & Awareness

Create a Google Form survey to understand awareness about sustainable development.

Include at least 10 well-designed questions.

Examples of survey questions:

- Do you practice saving water and electricity at home?
- Are you aware of the harmful effects of plastic pollution?
- Do you use eco-friendly products in daily life?
- Are you willing to volunteer for environmental activities?
- What environmental problem concerns you the most?

Task 2: Research & Analysis

Analyze the collected data and identify major awareness gaps or common problems.

Research any 3 to 5 sustainable practices or technologies being used globally.

Example Topics:

- Use of solar energy in households
- Rainwater harvesting systems
- Waste management and recycling techniques
- Electric vehicles and green transportation
- Sustainable agriculture practices

Task 3: Idea Generation

Based on the problems identified in Task 2, suggest possible solutions using scientific concepts.

Examples:

- A smart system to reduce electricity wastage
- An eco-friendly alternative to plastic
- A mobile app to track daily carbon footprint
- A low-cost water-saving device

Task 4: Prototype Design

Choose one idea and create a design/layout (on A4 sheet or digitally) for your proposed solution.

Examples:

- Draw a model of a Smart Eco-Friendly Home
- Create a design of a Waste Management System
- Design a Sustainability Tracking App

Task 5: Business Plan (B-Plan)

Create a simple business model around your idea including target users, need, cost, and implementation.

Examples:

- Who will use your solution?
- How will it benefit society?
- What will be its cost?
- How can it be implemented in real life?

PART II – Subject-wise Individual Assignments

This section includes individual assignments, projects, and activities aimed at strengthening subject knowledge, analytical skills, and self-learning abilities.

General Instructions:

- Part A, B, C are compulsory subjects for all. Parts D-E are to be attempted as per your subject.
- Follow the instructions for each subject.
- Each Part has to be done individually, under the concerned subject teacher's supervision.
- **Note:** Regular study and practice are essential for the Pre Mid-Term Examination.
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- **For project based HHW** (English Core, Economics and Legal Studies), the same instructions given below have to be followed:

Methodology- Students are required to conduct independent research and prepare a detailed project report. The following steps should be followed:

- ✓ Select an appropriate topic related to women empowerment.
- ✓ Gather information from reliable sources such as books, newspapers, journals, interviews, surveys, magazines, and authentic websites.
- ✓ Write a clear Statement of Purpose explaining the aim of the project.
- ✓ Support the project with facts, examples, references, surveys, or case studies wherever relevant.
- ✓ Organize the content under proper headings and sub-headings.
- ✓ Include creative elements such as posters, illustrations, poems, articles, interviews, or photographs wherever suitable.
- ✓ Conclude the project with your personal analysis and understanding of the topic.
- ✓ Mention all sources and references used for research.

Project Requirements

- ✓ The project file should be handwritten.
- ✓ Minimum length: 20 pages (excluding cover page and bibliography).
- ✓ Use proper headings, spacing, and presentation.
- ✓ Include relevant pictures, newspaper clippings, charts, survey findings, or literary extracts wherever possible.
- ✓ The work should reflect originality, creativity, and understanding of the topic.

Prescribed Format of the Project

- Cover Page
- Acknowledgement
- Certificate
- Index

- Statement of Purpose
- Introduction
- Main Content/Research
- Survey / Interview
- Reflection/ Conclusion
- Bibliography/ References

Important Instructions

- ✓ Submit the completed project file after the summer vacation as per the teacher's instructions.
- ✓ Ensure neatness, creativity, and timely submission.
- ✓ Projects copied directly from the internet will not be accepted.
- ✓ The project should reflect independent thinking, creativity, and meaningful research.

PART A (ENGLISH CORE)

PROJECT WORK

Objectives of the Project

The project work aims to help students:

- Develop reading, writing, speaking, and research skills through independent learning.
- Enhance creativity, critical thinking, and analytical abilities.
- Improve communication skills through surveys, interviews, article writing, and presentations.
- Understand the role of literature and language in promoting social awareness and change.

Suggested Areas for Research. (Choose any one or frame your own)

1. "Voices of Change: Women Empowerment in Contemporary Society"
2. "Breaking Barriers: The Journey of Women Towards Equality"
3. "Women and Education: The Key to Empowerment"
4. "Portrayal of Women in Literature and Society"
5. "From Silence to Strength: Women Finding Their Voice"
6. "The Changing Role of Women in Modern India"

PART B (CHEMISTRY)

- Q1. Calculate the number of atoms present in 44.8 L of nitrogen gas at STP.
- Q2. A compound contains 40% carbon, 6.7% hydrogen and 53.3% oxygen. Its molecular mass is 180 g mol⁻¹. Determine its molecular formula.
- Q3. The density of a 2 M solution of methanol in water is 0.976 g mL⁻¹. Calculate the molality of the solution.
- Q4. Calculate the mass of one molecule of carbon dioxide.
- Q5. An oxide of nitrogen contains 63.6% oxygen. Determine its empirical formula.
- Q6. Calculate the de Broglie wavelength associated with an electron moving with a velocity of 2.18 x 10⁶ m/s.
- Q7. Calculate the number of electrons, protons and neutrons present in ⁷⁹Br

Q8. A sample contains 1.2044×10^{24} molecules of ammonia gas. Calculate:

(a) Number of moles

(b) Mass of ammonia

Q9. Calculate the energy and frequency of a photon having wavelength 3×10^{-7} m.

Q10. Explain Bohr's model of hydrogen atom and derive the expression for the radius of the n th orbit.

Q11. Concentrated hydrochloric acid is 12 M. Calculate the volume of concentrated HCl required to prepare 500 mL of 0.5 M HCl solution.

Q12. State the limitations of Rutherford's atomic model. How did Bohr overcome these limitations?

PART C (PHYSICS)

CLICK ON THE LINK TO VIEW THE ASSIGNMENT

<file:///C:/Users/Dell/Desktop/HHW%20PHYSICS%20CLASSXI.pdf>

PART D (BIOLOGY)

1. Write the two different definitions of 'species.'
2. Prove that viruses can be non-living creatures.
3. Which advanced feature is seen in gymnosperms, which was not seen in the earlier group?
4. Gill slits are present in chordates, but these are not there in human beings. Explain.

Assertion-Reasoning Questions -

- a. Both assertion and reason are true, and reason is the correct explanation of assertion.
 - b. Both assertion and reason are true, but reason is not the correct explanation of assertion.
 - c. Assertion is true but reason is false.
 - d. Both assertion and reason are false.
5. Assertion: Cats and dogs have several similarities.

Reason: They both belong to Family Canidae

6. Assertion: Cyanobacteria are prokaryotes

Reason: They do not have a well-defined nucleus

7. Assertion: Bryophytes are called the amphibians of the plant kingdom

Reason: They have both gametophytic and sporophytic phases

8. Assertion: Sponges have cellular level of organisation

Reason: Their body is made up of cell aggregates

9. Why were fungi placed under plant kingdom, under the 2-kingdom classification? Why was their classification changed?

10. Differentiate between ascomycetes and basidiomycetes.

11. Briefly describe the lifecycle pattern of fern.

12. Explain the term and give the scientific name of the organism that has the following features-

Radial symmetry, metamerous, radula, cnidoblasts, hooks & suckers.

PART D (COMPUTER SCIENCE)

Q1. Rewrite the following invalid identifiers into valid identifiers.

1. 2value
2. first name
3. total-marks
4. class
5. student%marks
6. import
7. @price
8. annual income
9. while
10. total amount

Q2. Evaluate the following expressions.

1. $15 + 5 * 2$
2. $(12 - 4) * 3$
3. $20 // 3$
4. $20 \% 3$
5. $2 ** 4$
6. $5 + 2 * 3 - 1$
7. $18 / 3 + 2$
8. $7 + 3 * 2 ** 2$
9. $25 \% 4 + 6$
10. $10 + 5 // 2$

Q3. Write the python programs:

a. Input age of a person and display:

Child (below 13)

Teenager (13–19)

Adult (20–59)

Senior Citizen (60 and above)

b. A school gives scholarship according to the following conditions:

Marks above 90 and attendance above 85 → Full Scholarship

Marks above 80 and attendance above 75 → Half Scholarship

Marks above 70 → Merit Certificate

Otherwise → No Award

c. Input a number and check whether it is:

divisible by both 5 and 11

divisible only by 5

divisible only by 11

divisible by neither

PART D (ECONOMICS)

Relate the same entrepreneur with the following concepts:

Role in Economic Development, Employment generation, Contribution to GDP, Women empowerment, Production & Resources What factors of production are used? (Land, Labour, Capital, Entrepreneur) Market Structure (Basic Idea) Is it competitive or monopoly-based. Government Support. Any schemes supporting women entrepreneurs (like Mudra Yojana, Start-up India)

PART D (HINDUSTANI MUSIC)

Create a 50–60 page formal manuscript titled "The Fundamentals of Hindustani Sangeet," featuring a preface, personal writer's note, and a detailed index. The content must be organized into six academic chapters covering the definition of Music (Gayan, Vadan, Nritya), the science of Naad (Aahat and Anahat), the 22 microtones of Shruti, the classification of Swar (Shuddha and Vikrit), and the structural rules of Raga (including Time Theory), concluding with a practical section on notation and diagrams. Submissions should be formal, well-illustrated with flowcharts, and maintain a professional scholarly tone throughout.

PART D (HOME SCIENCE)

INSTRUCTION:

Choose any one of the following tasks and complete it creatively.

TASK 1: NUTRITION WHEEL (Spinning Wheel Model)

Topic: Food Groups & Their Functions

How to Make:

- Take two circular cardboard pieces (one slightly smaller than the other).
- Divide the larger circle into 5 sections and fill each with a food group (cereals & millets, pulses & legumes, dairy and meat products, fruits & vegetables, fats & sugar).

- Write nutrients and functions in each section.
- Add colourful illustrations or cut out pictures of foods.
- Attach both circles with a brass fastener/pin in the centre so the top wheel spins.
- Cut a small window on the top circle so when you spin it, one food group is revealed at a time.

OR

TASK 2: DEFICIENCY DISEASE MATCH BOX MODEL

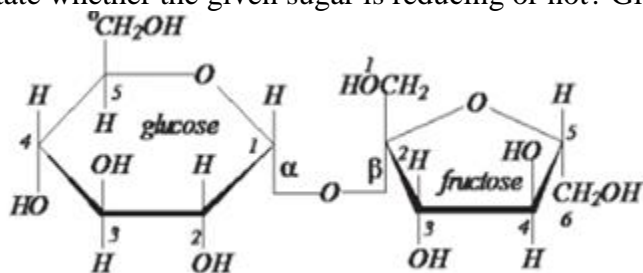
Topic: Nutritional Deficiency Diseases

How to Make:

- Collect 6–8 empty matchboxes and stack/glue them together like a chest of drawers.
- Label each matchbox drawer with a nutrient (Iron, Vitamin A, Vitamin C, Iodine, Vitamin D, Protein).
- Inside each drawer place a small folded chit/card with:
 - Deficiency disease name
 - Causes
 - Symptoms
 - Food sources
 - Prevention
- Decorate the outside with colourful paper and illustrations.

PART E (BIOTECHNOLOGY)

1. Differentiate between cellulose and peptidoglycan on the basis of-
 - a) Location
 - b) Repeating units.
2. Molecular weight of a protein is 22000 Da. Calculate the number of amino acid residues in it.
3. State any two differences between alpha helical and beta pleated sheet structure.
4. State whether the given sugar is reducing or not? Give reason for your answer.



5. Draw the structure of amino acid, if R=

- (a) –H
- (b) –CH₂-CH₂-S-CH₃

6. Name the following:

- (a) negatively charged amino acid (any one)
- (b) Uncharged amino acid with phenolic group
- (c) Uncharged amino acid with sulfhydryl group
- (d) amino acid lacking amino group

7. Justify giving suitable examples that Biotechnology is interdisciplinary in nature.

8. Diagrammatically represent the strategy for sequencing polypeptides.

9. Cloning is a technique scientists use to make exact genetic copies of living things. Genes, cells, tissues, and even whole animals can all be cloned. The molecular and cellular techniques of biotechnology like recombinant DNA technology, allow researchers to genetically engineer organisms, modifying them to achieve desirable traits. One of the technique used in animal cloning is SCNT.

(a) Expand SCNT.

(b) Which is the recipient cell in SCNT?

(c) Recombinant DNA technology coupled with microbial fermentation is used to manufacture a wide range of biobased products. Name two such products.

OR

(c) Cloning technology allows us to generate a population of genetically identical molecules. Name the biotechnology products obtained from the following sources- (i) *Escherichia coli* (ii) Yeast

10. Name any two homopolysaccharides and differentiate between them on the basis of-

(i) Type of linkage (ii) Location (iii) Function

Which are the repeating units in the above two homopolysaccharides?

PART E (MATHEMATICS)

TASK-1-Project: "The Spiral of Strength"

Objective : This project uses the **Fibonacci Spiral** to represent the compounding growth of female influence and leadership throughout history.

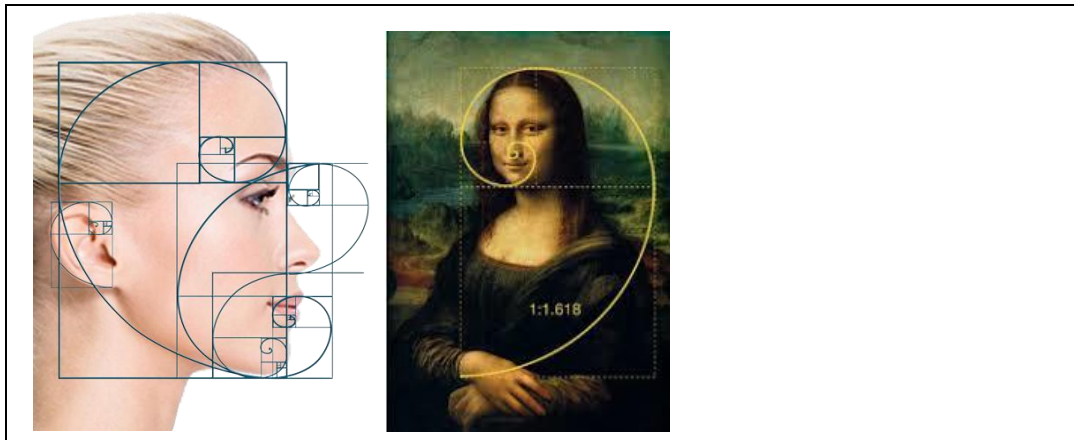
The Fibonacci sequence

A sequence where each term is the sum of the two preceding ones.

Instructions:

- **Geometric Visualization:** Construct the **Golden Spiral** using squares with side lengths equal to Fibonacci numbers (1x1, 2x2, 3x3, etc.).
- **Real-world Connection:** Write examples of Fibonacci in nature with pictures (sunflowers, shells)
- **Creative Component:** Use the spiral to frame a portrait of an **empowered woman**, highlighting how mathematical "divine proportions" exist in her natural features, symbolizing inherent strength

- **Progression::** Place a silhouette of a woman at the **center of the spiral** (the smallest square). This represents the seed of potential.
 - As the spiral expands, fill each larger square with icons or names of trailblazing women (e.g., Savitribai Phule, Marie Curie, Mary Kom) to show how one woman's progress leads to a "larger" impact for the next.



Important Instructions

- .Make separate project file for maths
- It include Acknowledgement, Certificate, Index , Introduction, MainContent &References
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- The project file should be handwritten,.It contains 10-15 pages(include relavant pictures,figures.
- . It ensure originality, neatness, creativity, and timely submission

TASK2: GIVEN ASSIGNMENT CAN BE ATTEMPTED IN SAME FILE.

ASSIGNMENT (MATHEMATICS)

1. For any two sets A and B prove by using properties of sets that:

(i) $(A \cup B) - (A \cap B) = (A - B) \cup (B - A)$

(ii) $(A \cap B) \cup (A - B) = A$

(iii) $(A \cup B) - A = B - A$

2. If $A = \{1,2,3\}$, $B = \{3,4\}$ and $C = \{4,5,6\}$, find

(i) $A \times (B \cap C)$ (ii) $(A \times B) \cap (A \times C)$

ii) $A \times (B \cup C)$ (iv) $(A \times B) \cup (A \times C)$

3. Let $A = \{1,2,3,4,5,6\}$. Define a relation R on set A by

$R = \{(x, y) : y = x + 1\}$

- (i) Depict this relation using an arrow diagram.
(ii) Write down the domain, co-domain and range of P.

4. Prove that :

$$\frac{\sin A + \sin 3A + \sin 5A}{\cos A + \cos 3A + \cos 5A} = \tan 3A$$

5. Prove that :

$$\frac{\sin 2\theta}{1 + \cos 2\theta} = \tan \theta$$

6. If $\sin x = \frac{\sqrt{5}}{3}$ and x lies in IInd quadrant, find the values of $\cos \frac{x}{2}$, $\sin \frac{x}{2}$ and $\tan \frac{x}{2}$.

7. Let R be a relation on Q defined by

$$R = \{(a,b) : a,b \in Q \text{ and } a - b \in Z\} \text{ Show that:}$$

$$(i) (a, a) \in R \text{ for all } a \in Q \quad (ii) (a, b) \in R \Rightarrow (b, a) \in R$$

$$(iii) (a, b) \in R \text{ and } (b, c) \in R \Rightarrow (a, c) \in R.$$

8. If $A = \{1, 2, 3, 4, 5\}$, $B = \{1, 3, 5, 8\}$, $C = \{2, 5, 7, 8\}$,
verify that $A - (B \cup C) = (A - B) \cap (A - C)$.

9. Prove that:

$$(i) \sin 65^\circ + \cos 65^\circ = \sqrt{2} \cos 20^\circ \quad (ii) \sin 47^\circ + \cos 77^\circ = \cos 17^\circ$$

10. Prove that:

$$\cos 3A + \cos 5A + \cos 7A + \cos 15A = 4 \cos 4A \cos 5A \cos 6A$$

11. Prove that

$$\sin A + \sin 2A + \sin 4A + \sin 5A = 4 \cos \frac{A}{2} \cos \frac{3A}{2} \sin 3A$$

12. Prove that:

$$(i) \sin 65^\circ + \cos 65^\circ = \sqrt{2} \cos 20^\circ \quad (ii) \sin 47^\circ + \cos 77^\circ = \cos 17^\circ$$

13. Prove that:

$$(i) \cos 3A + \cos 5A + \cos 7A + \cos 15A = 4 \cos 4A \cos 5A \cos 6A$$

14. Prove that

$$\sin A + \sin 2A + \sin 4A + \sin 5A = 4 \cos \frac{A}{2} \cos \frac{3A}{2} \sin 3A$$

15. Prove that $\sin^4 \frac{\pi}{8} + \sin^4 \frac{3\pi}{8} + \sin^4 \frac{5\pi}{8} + \sin^4 \frac{7\pi}{8} = \frac{3}{2}$

PART E (LEGAL STUDIES)

PROJECT WORK

Objectives of the Project

The project work aims to help students:

- Identify a legal issue and understand the remedies available under law.
- Develop research and analytical skills through the study of legal sources.
- Differentiate between various types of legal cases and issues.
- Apply relevant statutory provisions and case laws to real-life situations.
- Understand the role of law in bringing social change and justice in society.

Suggested Areas for Research

Students may choose any recent legislation, amendment, or legal reform that has contributed to social change. Some suggested topics are:

- Consumer Protection Act
- Right to Information Act
- Information Technology Act
- Protection of Children from Sexual Offences (POCSO) Act
- Domestic Violence Act
- Juvenile Justice Act
- Cyber Laws in India
- Environmental Protection Laws
- Data Protection and Privacy Laws
- Laws relating to Women's Rights

PART E (ARTIFICIAL INTELLIGENCE)

1. Earn a credential on IBM SkillsBuild on the topic Artificial Intelligence Fundamentals using the link:
<https://students.yourlearning.ibm.com/activity/PLAN-CC702B39D429>

2. This is a game built with machine learning. We draw, and a neural network tries to guess what you're drawing. Draw: 'Doctor', 'Scientist', 'Teacher', 'Pilot', 'Nurse', 'Police'.

<https://quickdraw.withgoogle.com/>

Did AI guess 'female doctor' when you drew a woman?

3. The experiment based on the computer vision domain of AI. It identifies that you draw and suggests the related images. To play the game, visit the following link on any computing device with speakers.

<https://www.autodraw.com/>

4. What are common job roles in AI, and how do women in these roles help society?

PART E (PHYSICAL EDUCATION)

Practical – 1: Fitness Test Administration (SAI kheloTest India)

Students are required to prepare a detailed practical record on the administration, procedure, scoring method, and significance of the SAI khelo India Fitness Test.

Practical – 2: Asanas for Lifestyle Diseases

Write the procedure, benefits, and contradictions of any two asanas for each lifestyle disease prescribed in the syllabus. Include proper presentation and explanation.

Practical – 3: IOA Recognized Sport/Game

Select any one IOA recognized sport or game of your choice. Include:

- Labeled diagram of the field/court
- Equipment specifications
- Important rules and regulations
- Terminology used in the game
- Fundamental skills and techniques