



ITL Public School
Summer Holiday Homework (2026–27)
Class XII
Physics

Theme: Physics Meets Artificial Intelligence & Computational Thinking

Dear Parents and Students,

To make learning more engaging and future-ready, this year's Physics Summer Holiday Homework integrates Artificial Intelligence (AI) and Computational Learning with core concepts from the CBSE Class XII Physics syllabus.

The objective is to help students:

- * Explore real-life applications of Physics.
- * Use AI tools responsibly for research and visualization.
- * Develop data analysis and computational thinking skills.
- * Present concepts creatively and scientifically.

Verifying Kirchhoff's Rules and the Wheatstone Bridge Using AI.

Unit: Current Electricity

Aim: To explore Kirchhoff's Circuit Laws and understand the working principle of the Wheatstone Bridge using simulation and AI tools.

Part A: Verification of Kirchhoff's Rules.

Suggested Simulation

Use the PhET Circuit Construction Kit: DC Virtual Lab.

1. Aim: To verify:

- * Junction Rule: Sum of currents entering a junction equals the sum leaving it.
- * Loop Rule: Sum of potential differences around a closed loop is zero.

1. Procedure

Construct a circuit with:

- * One battery (6 V)
- * Two resistors in parallel (e.g., 10 Ω and 20 Ω)
- * Ammeters in each branch

1. Record:

- * Total current entering the junction.
- * Currents in each branch.

1. Verify:

- * Measure potential drops around a loop and verify:

$$\sum V=0$$

4. Observation Table

Quantity Value

- * Total Current, I
- * Branch Current, $I_1 =$
- * Branch Current, $I_2 =$

5. Check:

$$I = I_1 + I_2$$

Part B: Wheatstone Bridge Investigation

Aim: To determine the unknown resistance when the bridge is balanced.

$$P/Q = R/S$$

At balance:

- * P, Q, and R are known resistances.
- * S is the unknown resistance.

Simple Activity

Take:

- * $P=10\Omega$
- * $Q=20\Omega$
- * $R =15\Omega$

Use the balance condition to calculate S.

Calculation

S=

P

Q×R

Students compute the value and verify using AI.

Conclusion

Students should summarize:

- * How current and voltage obey Kirchhoff's rules.
 - * How the Wheatstone bridge helps find an unknown resistance accurately.
 - * Why the bridge is most sensitive when balanced.
- Learning Outcomes:

Students will learn:

- * Conservation of charge and energy in electric circuits.
- * Application of Kirchhoff's rules.
- * Practical use of Wheatstone bridge circuits.

This project connects circuit theory, mathematical reasoning, and AI-assisted explanation in a clear and engaging way