



ITL Public School
Active Engagement of Young Minds during Summer Vacations (2026–27)
Class XI
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 XI 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.

(I) Investigating Projectile Motion with AI

Topic: Motion in a Plane

1. **Aim:** To study how the angle of projection affects the range and maximum height of a projectile.
2. **Task:** Use the PhET Projectile Motion Simulation to perform a simple virtual experiment.

Step-by-Step Instructions:

- * Open the Projectile Motion simulation.
- * Select: Object
- * Any object of your choice
- * Air Resistance: Off
- * Initial Speed: 20 m/s
- * Change only the launch angle.

3. Test the following angles:

- 15°
- 30°
- 45°
- 60°

* For each angle, note:

*Range (horizontal distance)

*Maximum Height

4. Observation Table

- Angle (°)
- Range (m)
- Maximum Height (m)

5. Graph Work

Draw:

- Angle vs Range
- Angle vs Maximum Height

5. Conclusion

Write 4–5 lines summarizing:

- Which angle gave the maximum range.
- How range changes with angle.
- How maximum height changes with angle.
- What you learned about projectile motion.

Learning Outcome

Students will understand that:

- The range depends on the launch angle.
- The maximum range is obtained at about 45° (when air resistance is neglected).
- Complementary angles such as 30° and 60° produce similar ranges.
- Higher angles generally produce greater maximum heights.

This project is simple to perform and helps students visualize one of the most important applications of motion in two dimensions.

(II) Exploring Simple Harmonic Motion with AI

Topic: Oscillations

1. **Aim:** To study how the time period of a pendulum depends on its length.
2. **Task:** Investigate the motion of a simple pendulum using a simulation or a pendulum made at home.

Option A: Using Simulation

Use the PhET Pendulum Lab Simulation.

Option B: Home Experiment

Make a simple pendulum using:

- A thread
- A small metal nut or washer
- A ruler
- A stopwatch

Step-by-Step Instructions:

Set the pendulum length to:

- 20 cm
- 40 cm
- 60 cm
- 80 cm
- 100 cm

Keep the angle of release small (about 10°).

Measure the time taken for 10 oscillations.

Calculate the time period:

$$T = \frac{\text{Time for 10 oscillations}}{10}$$

Observation Table

| Length (cm) | Time for 10 Oscillations (s) | Time Period T (s) |
|-------------|------------------------------|-------------------|
| 20 | | |
| 40 | | |
| 60 | | |
| 80 | | |
| 100 | | |

Write the explanation in your own words.

Graph Work

Plot:

- Length v/s Time Period
- Length v/s T^2

Conclusion

Write 4–5 lines on:

- How the time period changes with length.
- Whether mass affects the time period.
- Real-life applications of pendulum motion.

Learning Outcome

Students will learn that:

- The time period increases with the length of the pendulum.
- For small oscillations, T^2 is directly proportional to length.
- Pendulums are used in clocks, seismometers, and measuring instruments.

This project is easy to perform at home and beautifully connects experimental observation, graph analysis, and AI-assisted understanding of oscillatory motion.

Note: These are sample projects. The students may prepare any other project from class XI curriculum on similar lines.