

ACTIVITY OF INTEGRATION (S.5)

PHYSICS: STATICS

Scenario:

Your school is planning to install a new welcome billboard at the gate. The school management wants the signboard mounted high on a single vertical pole with metal support arms. Before construction, the headteacher seeks the help of the Physics class to ensure the billboard won't tip over or collapse during strong winds or heavy rain.

As a Physics student, you're asked to analyze how the weight of the billboard and the force of the wind will affect the stability of the structure. The team needs your help to ensure that the resultant force and turning moments acting on the billboard are balanced and safe for long-term use

Tasks:

1. The billboard will experience two main forces:

Its weight (W) acting vertically down at the center. A horizontal force (F) from wind acting on one side of the board.

- i) Draw a free-body diagram and calculate the resultant force using vector methods.
- ii) Discuss what could happen if these forces are not balanced. Explain how the placement of supports can help reduce the effects of unbalanced forces.

2. Assume the pole is fixed vertically in the ground and the billboard extends horizontally.

- Use the principle of moments to explain how to position a support arm (like a brace) to keep the billboard stable.
- Discuss the role of the center of gravity and how its position affects stability.
- Recommend safety measures the builders should consider when positioning support structures.