ST. AUSTIN'S HIGH SCHOOL KAKUNYU WAKISO

SENIOR FIVE END OF TERM ONE 2025

PHYSICS

45 MINUTES

INSTRUCTIONS:

- Attempt all items.
- Where necessary take $g = 9.81\ m/s^2$

ITEM 1:

Mark, a physics student at St. Austin's High School in Wakiso, conducted an investigation into the factors affecting the period of oscillation of a simple pendulum. Specifically, he explored how length, mass, and acceleration due to gravity impact the time it takes for one complete swing. In his report, Mark presented scientific and analytical findings on the following:

I. The derived relationship between period, mass,length, and acceleration due to gravity.

II. The implications and limitations of this relationship.

III. The correctness and validation of the relationship.

In a related scenario, a 5 kg banner of the Scripture Union in the school compound is suspended from a tree branch by two ropes. One rope makes a 30° angle with the vertical, while the other rope makes a 60° angle. Sarah, a friend of Mark's, is curious about the tensions in the ropes that keep the banner in equilibrium.

TASK

As a physics student:

a) Identify the facts presented in Mark's report.

b) Determine the forces in the ropes that keep the banner suspended. Hence provide an answer to Sarah, stating any assumptions made during the calculation. (25 scores)

END