

GIFT ~~MARTIN~~ PCMVICT

JINJA PROGRESSIVE SECONDARY SCHOOL

END OF TERM 3 EXAMS 2025

S.5 PHYSICS PAPER 2

DURATION: 1:30 HOURS

**Instructions**

Attempt all questions showing clearly all the necessary steps

**ITEM 1**

In a school physics lab, a group of learners are investigating waves using a slinky spring and a vibrating ruler fixed at one end. They vary the frequency of vibration and observe how waves travel along the spring. At certain frequencies, the waves reflect to produce a stationary pattern. Later, the learners switch to using a rubber cord stretched between two clamps. As the cord is vibrating, they observed particles of the cord moving perpendicularly to the direction of travel of the wave. However in slinky spring, the particles move along the direction of wave propagation but no one could tell the types of wave produced by two. The wave on the rubber cord is described by;

$$Y=0.06\sin(50\pi t-20\pi x)$$

The students were told that this equation can be used to get the amplitude and frequency but no one can manage.,

The students want to know the direction from where the wave produced by the rubber cord is coming from where it is going as well as displacement equation which can be produced by a wave moving in a direction opposite to the one above.

Hint:

For the students to achieve the aim of the investigation, the velocity of the wave produced by the rubber cord should not be less than  $2.5\text{ms}^{-1}$

The lab also has different tuning forks of different frequencies and a resonance tube filled with water and a tap at the other end.

### Task

As a physics learner, help the students to:

a) Determine:

i) Amplitude

ii) Frequency

b) Know whether the investigation was successful

c) Know the types of waves produced by the rubber cord and the slinky spring

d) Know the differences between the types of waves mentioned in (c) above

e) Know the direction where the wave is originating

f) Write a displacement equation for the wave moving in a direction opposite to the one above

g) Know the type of a wave formed when the above two waves meet and deduce an expression for it.

h) How they could determine the velocity of sound in air using a resonance tube.

### ITEM 2

Two individuals A and B are provided with identical sources of sound of frequency 800Hz each as they stand at about 50m apart on a straight line. A S.5 student is moving between the individuals from one to the other at a speed of  $5\text{ms}^{-1}$ .

As he was moving, he noticed a rise and fall in sound heard. However, he was confused and wondering how that could happen. There was also a guitar with a wire of length 12cm, mass 0.2g and tension 100N which was plucked at the mid to produce sound. The students were arguing on how the length of a wire affects frequency.

#### Hint

There is a sonometer and different tuning forks of known frequencies with a small mass and a string.

Speed of sound in air is  $330\text{ms}^{-1}$

### Task

As a student of a physics;

- a) State and explain what the student heard and how it is formed
- b) Determine the number of intense sounds heard by the student
- c) Determine the frequency of the third harmonic produced by the guitar
- d) Carryout an investigation to show how frequency varies with length provided the tension and mass per unit length is kept constant.

**MERRY CHRISTMAS AND PROSPEROUS NEW YEAR AS YOU  
CONTINUE INTERGRATING THE KNOWLEDGE OF  
PHYSICS.....**