

535/1
PHYSICS
Paper 1
JUNE 2024
2½ hours

RESOURCEFUL MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 1

Theory

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of two sections; A and B. It has seven examination items.*
- *Section A has three compulsory items.*
- *Section B has two parts; I and II. Answer one item from each part.*
- *Answer five items in all.*
- *Any additional item(s) answered will not be scored.*
- *All answers must be written in the booklets provided.*

SECTION A

Answer all the items from this section

Item one

A couple organized to attend a party. The man dressed in a yellow shirt, red neck tie and white trousers with the wife putting on a blue party dress dotted with magenta flowers and yellow strips. As they mixed up while dancing, the lady went to make a call but, on her way, back the DJ switched on the rotating red and blue party lights. The lady could no longer identify her husband by the color of the suit neither could the husband identify his wife by her clothes. During the search, the lady went and stood about 60m from a nearby building and started calling loudly but she was hearing as if another woman was repeating after her. This annoyed her more and she left for home swearing that she was going to divorce.

Hint: The speed of light = 300ms^{-1}

Task: Use your physics knowledge to;

- Explain to the couple what might have confused them when the lights were switched.
- Explain to the lady what seemed like another lady was imitating her.
- Advise the couple.

Item two

The government has discovered a precious and rare mineral in one part of the country. A team of men picked samples and kept them in a store of one of the nearby hospitals where photographic plates are also stored. The mineral was checked on at regular intervals and the following observations were made;

- All photographic plates had darkened
- Its mass reduced spontaneously with time as shown below

Mass (g)	200	150	70	33	25
Time (days)	0	4	16	28	30

As a physics learner,

- Support the view that the mineral is radioactive.
- Use the graph to estimate its half-life.
- Explain the best way of storing this rare mineral.

- d) What are the dangers of exposing this rare mineral to the public?

Item three

An article in the newspaper gave information that on that 2nd December 2022, Ugandan engineers with the help of Japanese engineers launched a satellite. The literature teacher who picked interest in the article found new words like artificial and natural satellites. He developed a lot of unanswered questions that could be answered by a physics learner like you.

- a) Explain the difference between the two types of satellites in the article.
- b) With reasons, justify why Uganda should spend all that much money to launch its own satellite.
- c) Incase Uganda is to develop a super rocket capable of reaching different planets, list reasons for planets it can land on and planets it cannot land on.

SECTION B

PART ONE

Answer one item from this part

Item four

During a cross-country marathon, a group of boys competed. The route to be followed had a slope from the starting point covering 3km, a flat portion covering 2km and a steep road covering 1km.

The winner of the race was John after using a total time of 1 hour and 20 minutes. Many people celebrated his victory and offered to remove his wet shirt as some were fanning air across his body which John could not understand.

When John was interviewed, he told them that he accelerated uniformly as he was sloping, maintained a constant speed along the flat portion of the road and retarded uniformly while ascending.

As a learner of physics,

- (i) Draw a sketch graph to represent John's motion.
- (ii) Help John to determine his average speed.
- (iii) Give reasons why John's shirt had to be removed after the race and explain what happened.

Item five

Two men in a village are always contracted to dig deep holes in homes and in schools. They possess the following equipment; a hoe, wheelbarrow, hammer, ropes, nails, axe, spades, bucket, tape measure, and a pulley of three pulleys. As they work, the hole deepens and a bucket tied on a rope is fixed on the pulley system to remove the soil.

After the day's work, the pulley system is found to be warm which they cannot explain.

Hint.

A bucket filled with soil weighs 12kg and the efficiency of pulley system is 80%.

As a physics learner,

- a) Help the men to categorize any five of their machines in accordance to the class of levers
- b) Draw a diagram of the pulley system they use showing how the strings are aligned in simplifying their work.
- c) Determine the effort applied.
- d) Explain to the men why the efficiency of their machine is less than 100% and suggest ways how they could increase its efficiency.
- e) Explain the cause of the heat on the pulley system.

PART TWO

Answer one item from this part.

Item six

A business person has started a large-scale business and wants to understand his daily power usage. He also needs guidance on choosing a generator, saving power, and ensuring his workers are knowledgeable about wiring and maintenance. He has the following electrical instruments.

12 security bulbs (5W each) operating for 12 hours a day

A 65W refrigerator operating for 24 hours a day

A 3000W juice making machine operating for 5 hours a day

Tasks:

As a student of physics, you have been requested to;

- (a) Assist him to know his daily power usage from the listed electrical instruments
- (b) Choose a suitable generator for his business needs and explain the operation of the chosen generator with a labelled diagram.
- (c) Describe to his workers the insulator colour codes used in domestic wiring.
- (d) Provide suggestions on how he can save energy.

Item seven

The member of parliament of a remote village is trying to connect each home to the main super grid electricity 10 km away from a voltage of 1200V and 0.5A flowing. The homes need only 240V and 5A. The MP has secured poles, a transformer with a ratio of its turns being 5:1 bought thin wires to transmit electricity but he is not certain whether the items obtained will work.

As a learner of physics,

- (a) Explain to the MP if the transformer secured is suitable.
- (b) Use a diagram to explain to the MP how a transformer works.
- (c) Explain the likely causes for the 80% efficiency and how it can be improved.
- (d) Advise the MP on the wires he secured

END.