PHYSICS PAPER 1

ITEM 1

The manager operates a mini supermarket and has many customers. He has a challenge of the theft from his fridge and cannot afford the cost of camera to help. At the same instant light is a form of energy that causes sensation of vision on falling into your eyes. Light belongs to a family of waves called electromagnetic waves whose propagation can be shown by the figure below.

TASk

As a physics student

1. Help the manger to come up with an optical arrangement to solve the challenges.
2. State any properties that are exhibited by light as an electromagnetic wave and also use the figure 1 above to mention the amplitude, frequency and wavelength of the wave.

(Hint speed of light in air is 3.0X108ms-1

ITEM 2

Radioactivity is known to be one of the most important processsesion applied science in fields such as industry, medicine and agriculture. However radio isotopes should be handled with care and one of the radioactive elements reacts according to the reaction below.



TASk

1. As a physics student; explain two of the medical and industrial uses of radioactivity.
2. Why should the waste material be handled with care.
3. Complete correctly the equation written by the scientist.

ITEM 3

Your elder brother who stays abroad requested your mother to pay him a visit in Canada. Your brother is a resisdent at a place near the shores of the Atlantic Ocean. On arrival, your mother calls home but to the surprise of your relatives around, she was saying its half past mid-day in Canada yet it was around 8:00pm here in Uganda. Your mother also informed you on the phone that she had seen something she had never seen before. The

water levels could rise high on the ocean and then later lowers exposing a large space free of water. She enjoyed this view, but she was left wondering.

Task

As a physics student explain to your mother

1. The difference in time by the time she called home.
2. The rise and fall in water levels she observed.
3. The economical importance of the rise and fall in water levels observed.
4. How the phone signals were transmitted from Canada to Uganda.

SECTION B

PART I

ITEM 4

Your dad is a civil servant who works from upcountry in Hoima city which is 230km from Kampala city. He would like to be at work at exactly 8:00am on Monday morning. Your dad woke up at 4:00am and set off for his journey. After travelling some distance, he came across a truck that had an accident due to a slippery road and blocked the road. He decides to apply the brakes to stop the car from a speed of 80km/hr. On checking his brakes the pads were very hot. After 30 minutes, the truck was removed and he continued with his journey. He reached Hoima at 8:30am. Your dad wants to analyse his journey so that he can plan better and avoid getting late next time.

TASK

AS a physics student

1. help your dad to find out the
2. total time for the whole journey
3. Average speed for the whole journey
4. Why the brake pads felt hot.
5. The increase in temperature of the pads when stopped the car from a speed of 80km/hr. and state any assumptions taken.

(b) Advise the truck driver on how to avoid such an accident next time.

Use: Mass of dad’s car = 2 tonnes. Specific heat capacity. of maternal of brake pads= 4000Jkg-1K-1

Mass of brake pads = 2.5kg

ITEM 5

AS the eldest child at home, mother left you with your youngest sister who is 8 months old. As she (mother) was leaving for work in the morning. Your mum told you to bathe the baby with warm water at a temperature of 300C and then cover the baby properly with in a sweater after bathing her. Your mum put for you 2 liters of cold water 200C in the baby’s basin and hot water at 900 in the flask. However, when the baby woke up, she was crying so much that you decided to carry her and your brother help to mix the water for bathing.

TASK

AS a physics student help your brother obtain

1. i) The quantity of hot water to mix with cold water and give any assumption taken.

ii) How the flask was able to keep the water hot for a long period.

1. Why did your mother order you to cover the baby heavily after bathing

(Hint specific heat capacity of…. = 4200Jkg-1K-1, density of water = 1000kgm-3)

PART II

ITEM 6

Mr. Mulumba is a real estate developer who has a number of houses for rent in a certain town. However, due to the large population in the town, the houses do not receive sufficient power supply but the electricity bulls are very high. The tenants have threatened to vacate the houses if he doesn’t work on the problem.

Mr. Mulumba’s premises have to be organized as shown by the figure below when the loads R1, R2, R3, R4 and R5 represented the houses with two meters A1and A2

Hint 

TASK

As a physics student help Mr. Mulumba to

1. Solve the problem of …power
2. Sensitize the tenants how reduce the electricity bulbs.
3. Obtain the reading of the meters A1 and A2

ITEM 7

One of your neighbors has just finished his house and wishes to install electricity. He needs to have some knowledge on what exactly is supposed to be done before approaching any electrician. His house is next to a factory and the only power line available transmits power to the factory.

He has a radio rated 500W which he wishes to use for 2 hours daily and a television set rated 80W that he views for 3 hours daily. He has been directed to you for guidance.

TASK

AS a physics learner guide your neighbor

1. On the connection of the following components with reasons

i) fuse

ii) sockets.

1. How much money will be paying monthly for the electricity consumed by the radio and television sets?

Take: 30 days for one month

1. Which device he will use to tap electricity from the factory line safely and explain to him how the device works.

END