

KIYALA HIGH SCHOOL
END OF YEAR ASSESSMENT TEST 2024
PHYSICS
S.3

Time: 1hr:30mins.

INSTRUCTIONS:

- The paper contains *three* items.
- attempt *all the two* items.

Item 1

During a dry season, a school resorted to drawing water from an underground well 8 m deep. Originally, they did it manually by lifting a metallic bucket of mass 4 kg and volume 20 liters. The school workers however complained that the bucket was very cold in the morning, very hot in the afternoon when the sun was up. It was also very tiring to keep pulling up the bucket manually. They suggested a pulley system of 4 wheels and an efficiency of 80 % be used to help them work quicker. None of them could however tell how the pulley works and how much effort would be required to raise the bucket.

Hint; Acceleration due to gravity = 10 ms^{-2}

Use your knowledge of physics to;

- (a) Explain what makes the bucket very cold in the morning and hot when the sun is up?
- (b) Show what the pulley system suggested above looks like and how it works.
- (c) Determine if a force of 5 N will be enough to give the pulley system an efficiency of 80 %.
- (d) Suggest ways in which the efficiency of the pulley system above can be improved.

Turn Over

Item 2

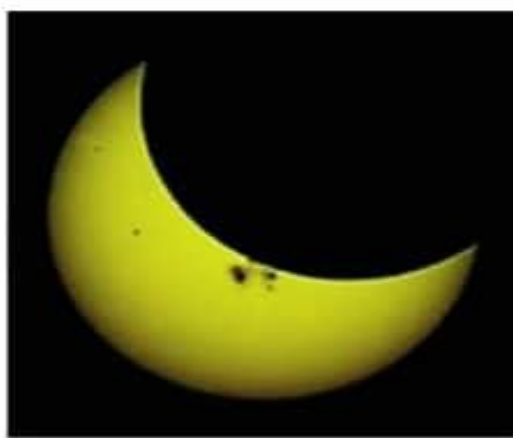
Long time ago eclipses were considered as a message from the gods' sine the people in that age dwelt so much in the spiritual realm than the scientific word. But with the development of science and technology, eclipses can now easily be explained scientifically instead of spiritually. Whenever eclipses occur many people gather out in open places to watch the beautiful view of the heavenly bodies as they align themselves in a beautiful display.

However, in most remote areas of Uganda some people still observe the eclipse directly using naked eyes not aware of the risk they are exposing their eyes to in the long run.

SUPPORT MATERIAL



(a) Total eclipse



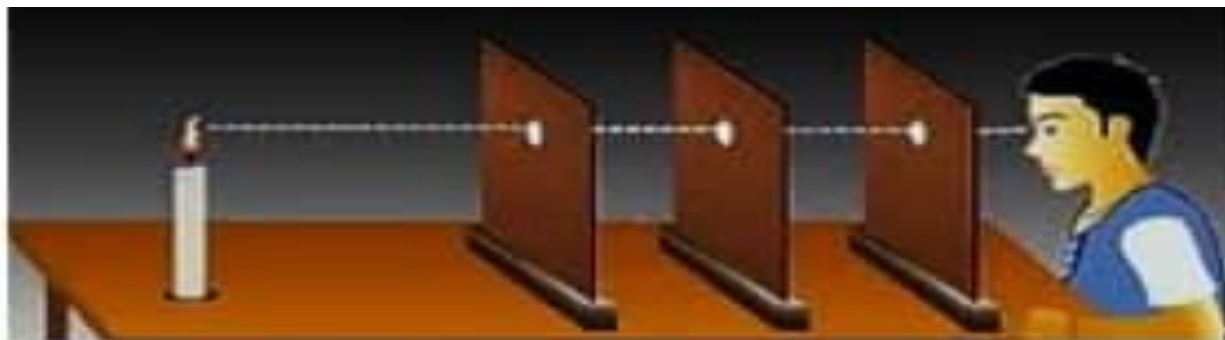
(b) Partial eclipse

Task

As a learner of physics;

- Explain the difference between total and partial eclipse.
- Using illustrations, explain the differences between solar eclipse and lunar eclipse.

In a certain experiment to investigate nature of light, the set up below was arranged.



- State the property of light being investigated and explain its implications in daily life.
- Explain what would happen when one of the cardboards is displaced slightly.

Item 3

During the midday heat of an extremely hot day, district engineers made a visit to a construction site situated near a primary school. However, one of the engineers expressed concern about a foul odor coming from the primary school latrines. This prompted him to approach the school administrators, who admitted their lack of knowledge regarding the cause of the odor

Spread, attributing it to hot weather conditions beyond their control. A week later the engineers presented their findings:

- Some construction materials lacked sufficient mechanical properties.

- Carrying concrete on their heads posed a risk to the builder's safety. They urged them to continue using concrete however recommended reinforcing concrete for increased strength.
- A small material of the same type as the iron bars used at the site measuring 14cm in length, exhibited an extension of 0.3cm when subjected to a load of 20kg .

This information caused confusion among the builders.

Hint: *the diameter of the iron sample material (having the same properties as the iron bars used at the site) was $7 \times 10^{-2}\text{mm}$, the recommended iron bars should have a Young's modulus of at least $4.0 \times 10^9 \text{Nm}^{-1}$, acceleration due to gravity, $g = 10\text{ms}^{-2}$*

Task

Having acquired some physics knowledge, help

- a) The builders understand
 - i) The emphasized mechanical properties highlighted in the report.
 - ii) Why they urged them to continue using concrete, what it means by reinforcing concrete and suggest alternative methods for transporting concrete to higher floors.
- b) The builders evaluate whether the iron bars used were suitable for construction of such structures.
- c) The school administrators understand why the odor could spread much during hot days and provide strategies to minimize the odor spread

Wishing you Good luck