



S3 PHYSICS

Time allowed: 2 hours and 30 minutes

Instructions:

- ✓ Attempt all questions in Section A and any two from Section B
- ✓ Clean and Tidy Work is a Must
- ✓ Extra Questions answered will not be marked
- ✓ Silent non-programmable calculators and log books may be used.
- ✓ Each question in Section A carries 5 marks and each question in Section B carries 15 marks.

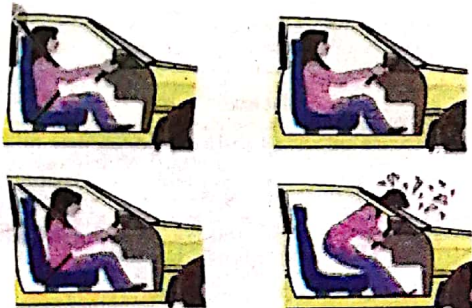
SECTION A

1. Explain the following observations as they happen in real life.

(a) The leaf of a coco yam never gets wet with water.



(b) There is always a forward jerk by occupants when a vehicle is stopped suddenly



2. Complete the following statements by filling the correct answer in the space provided.

- (a) Pressure in liquids mainly depends on and
- (b) is an example of a magnetic material and is an example of a non-magnetic material.
- (c) The temperature 50°F is equivalent to $^{\circ}\text{C}$.
- (d) images are formed when an object is placed between two plane mirrors inclined at an angle of 60° .
- (e) There were planets in the solar system until 2006 when planet was regarded not planet because it was too small.

THE TEACHERS

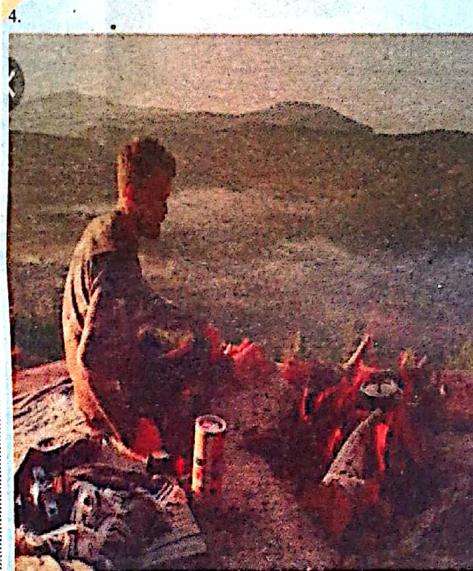


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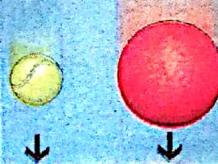
TOMMY SSEMWANGA,
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While walking in the desert, Lubega felt so thirsty. But as he continued walking, he saw a very big pool of water ahead of him and he ran fast towards it. Unfortunately, he did not find the water there. Explain this illusion to Lubega.



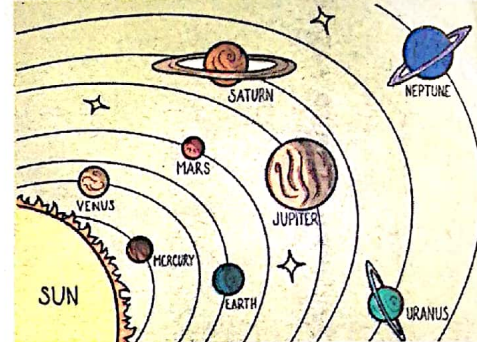
While climbing Mountain Rwenzori, a tourist noticed a gradual increase in the time required to prepare food as he went higher and higher. The water though, would easily boil. Why do you think this happened?

GRAVITY acting on two different masses which will fall first?



When two objects of different masses are released from the same height simultaneously in a vacuum, they hit the ground at the same time and with the same velocity. Obtain the expression of their velocity to support the statement. Use the expression to generate an explanation for the time.

6.



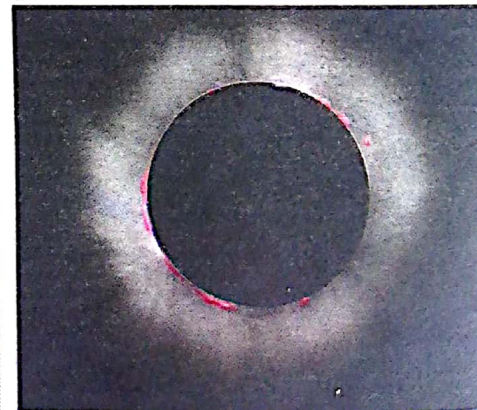
OUR SOLAR SYSTEM

- (a) What components make up the solar system?
- (b) Based on what you know about the solar system. Do you think it is important to us? Why do you think so?
- (c) List at least six facts about the solar system.
- (d) Why do you think a year has different numbers of days for the different planets?



After a heavy storm in Karamoja district, the Government gave out maize flour, each household would get maize flour depending on the number of members in such a household. Unfortunately, the in-charge of delivery did not carry a weighing scale. The residents only had a uniform wooden beam of mass 100kg and one stone of known mass 25kg. Describe how they can measure 10 kg of maize flour required by a family.

8.



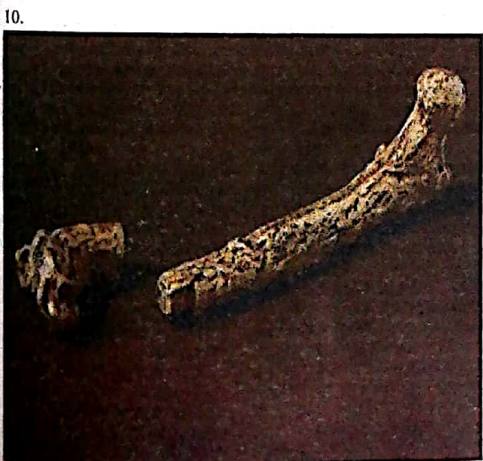
On a given day, darkness came during day in our village located in Kapchorwa, the sun got fully covered and the citizens all wondered and grumbles would be heard from them, "may be the judgement day has come". Unfortunately, none of us had any information about what was happening! As a student of physics with knowledge of light and the solar system, help us to understand this phenomenon

S3 PHYSICS



On a construction site, there is always a mechanical test done on all construction materials before they are accepted or rejected. The following table shows the different materials and other details. If a material can only be accepted if its Young's modulus exceeds $2 \times 10^7 \text{ Nm}^{-2}$. Determine the amount of money that was wasted in the purchase of some of the items below;

Item	Quantity	Price per unit	Stress to be undergone (Pa)	Strain to be experienced
Circular metallic sheets	40 pieces	UGX 60,000	4000	0.00015
Nails	50 kg	UGX 7000	6000	0.0006



During a research by archeologists, it was found out that a bone from an animal has a radio-active component whose initial mass was 8000 g. It currently has a mass of 7.8125g left and its half-life is 12 years. Establish when this animal was killed.

THE TEACHERS



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SECTION B



The Ministry of Health wishes to transport a vaccine whose effectiveness greatly depends on its temperature from National Medical Stores (NMS) in Kampala to Kigumba Health Centre IV using its trucks. Kigumba is located 200km away from NMS and trucks move at an average speed of 80 kmh^{-1} . The vaccine is only effective when its temperature is between 96°C to -26°C . In this range, the vaccine is in a liquid state.

In order to regulate the temperatures, the vaccine is put in a very thin container which is then placed in a water bath of mass 2.5 kg. The water bath and the vaccine are at 96°C before departure. The temperature of the water in the bath drops at 1°C/min and the water takes 8 minutes to freeze. When frozen, its temperature drops at 0.5°C/min . The temperature drops are only inevitable during transportation but can be dealt with when trucks reach their destination. By the time the trucks reach their destination, the total heat lost from the water and vaccine is $2 \times 10^6 \text{ J}$.

As a student with knowledge about heat quantities, help the medical team in charge of distributing the vaccine to determine its heat capacity and also help them know whether it will reach the health center when it is effective

Support

Assume that heat absorbed by the medicine container is negligible.
 ✓ Specific latent heat of fusion of ice = $3.36 \times 10^5 \text{ Jkg}^{-1}$
 ✓ Specific latent heat of vaporization of steam = $2.3 \times 10^6 \text{ Jkg}^{-1}$
 ✓ Specific heat capacity of water and ice are $4200 \text{ Jkg}^{-1} \text{ K}^{-1}$ and $2100 \text{ Jkg}^{-1} \text{ K}^{-1}$ respectively.

12.



A traffic investigator is analyzing a crash scene that involved collision of a heavy trailer moving at 30 km/hr with a stationary passenger van. After her investigations, she reported her findings to the media journalists as follows;

- > the trailer and its contents had a mass 3000kg and was travelling at a velocity of 50 km/hr just before the collision.
- > The passenger van had a mass of 1000 kg
- > The truck driver was not putting on the seat belts
- > Truck driver was severely injured as he was thrown out of the truck through the front windshield
- > The driver of the trailer applied the brakes late, so he failed to stop the truck
- > The two travelled together after collision for a distance of 20 meters before they stopped.

Task: The journalists wish to know if the collision was elastic or otherwise, the velocity with which the vehicles moved after the collision. They also wish to know if there are any dangers of not fastening the seat belts, why the brakes were not able to stop the truck suddenly. As a physics student, help the traffic officer answer the following questions arising from the journalists. Determine the deceleration of each of the vehicles after the collision

13. As you carry out your research using a convex lens of power 10 D, you accidentally drop the lens and it gets broken. When you go to ask for another convex lens, you are given a box containing several distinct convex and concave lenses from which you have to pick a lens similar to what you had. How would you draw a difference between the concave and convex lens? Mention the quickest procedures you would follow to determine the power of the lens so as to meet the required needs. Illustrate using a ray diagram.



SOLUTIONS NEXT FRIDAY

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