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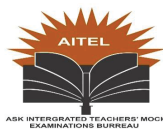
AITEL EXAMINATION

UGANDA CERTIFICATE OF LOWER CURRICULUM EDUCATION
END OF YEAR EXAMINATIONS 2023
535/1 PHYSICS (Theory)
Paper 1

S.2

INSTRUCTIONS: $2^{1}/_{4}$ **Hours**

This paper consists of two sections **A** and **B.** Answer **all** items in section **A** and any **two** items in section **B.**

Answers to **section A**, are to be written in the blank **spaces** provided.

Answers to **section B** items are to be written in **separate** answer sheets provided.

All items in **section B** carry **equal scores**.

Any **additional** item(s) answered in section **B** will **not** be marked.

Silent-non programmable scientific calculators may be used.

Assume where necessary;

Acceleration due to gravity, **g = 10 ms⁻²**

Density of water, **ρ_w = 1000 kgm⁻³**

FOR OFFICIAL USE ONLY			
ITEM NUMBER		**SCORES**	**EXAMINER'S INITIAL**
SECTION A	1-10		
SECTION B	NO.		
	NO.		
TOTAL SCORES			

Turn Over

SECTION A (40 Scores)

All working **must** be shown clearly in the spaces provided.

1. During construction, a material of **relative density 7.8** was identified to be used.

   a) As a S.2 learner, what do you understand by the term **relative density** of a substance? (**01 score**)

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   b) Apart from identifying materials for construction, where do we apply the knowledge of relative density in our day to day life? Give one(**01 score**)

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   c) Using water as a reference material, determine the density of the material in the question (**02 scores**)

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2. A single force which produces the same effect on the body as a number of forces acting on the same body is known as ……………………………….. And cohesive and adhesive forces are inter − molecular forces which hold molecules of the ………………………...………………….... and ……………………….……respectively together. An insecticide placed in one corner of the house kills a mosquito resting on the ceiling due to …………………………………..………..…… (**04 scores**)

3. Nelson wants to construct a liquid − in − glass thermometer. He is currently in a place whose temperature range is $90\ ^0C\ to\ 70\ ^0C$.

   a) With a reason which liquid should Nelson use during the process (**01 score**)

   Liquid: …………………………………………………………………

   Reason: …………………………………………………………………

   b) Suppose he is done with the construction process and he does not know how to calibrate it. Make a simple write up he can follow to calibrate it without any external help. (**03 scores**)

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4. Two men James and Peter were tasked to transfer bags of cement. Peter lifted 2 bags each weighing 50 kg and carried them through a distance of 4 metres. James carried one bag from the ground floor to the first floor using 150 stairs of height 0.02 metres each.

   By calculation, of the two men who did more work? (**04 scores**)

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5. a) Musa bought a package of weight 350N in a box whose dimensions are $5m\times1m\times3m$. Calculate the minimum and maximum pressure the box can exert on its support. (**02 scores**)

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   b) A woman putting on high – heeled shoes damage a cemented floor compared to one putting on flat shoes. Explain this real-life observation. (**02 scores**)

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6. a) A hydraulic car brake works on the principle of transmission of pressure in liquids known as ………………………………….. which states that pressure applied at one point of an enclosed fluid is ………………………..…..transmitted throughout the whole fluid and in all the directions. (**02 scores)**

b) A hydraulic press machine also applies the same principle above. At a certain garage it is used to lift a car of weight W, resting on a piston of cross – sectional area $100cm^2$ by using an effort of 20N at a piston of cross – sectional area of $2cm^2$. Calculate the weight, **W** of the car. (**02 scores**)

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7. Atmospheric pressure is the pressure exerted by the weight of air on all objects on the earth's surface. It is measured using a Barometer.

Give and explain one real life situation that really demonstrates that atmospheric pressure does exist. (**04 scores**)

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8. A plank balances horizontally on a log of wood which acts as a pivot. A girl sits on one end of the plank and her brother pushes down on the other end to make it balance horizontally as shown below.
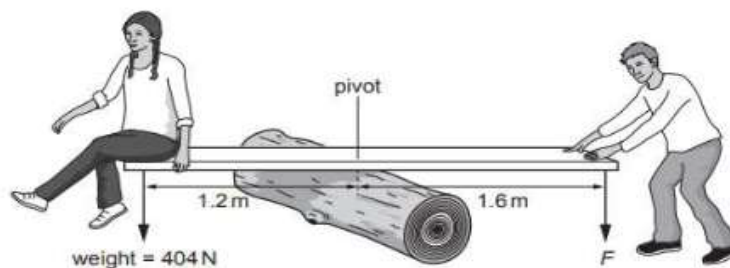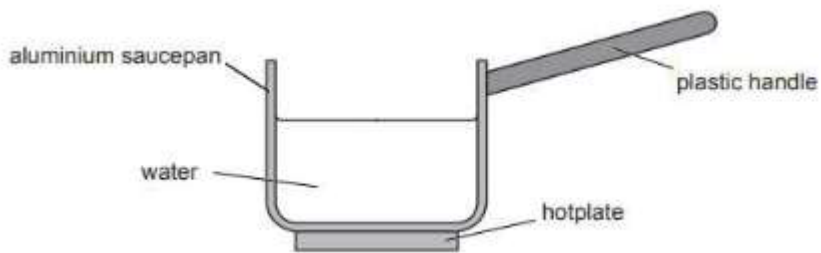
a) Calculate the moment of the girl's weight about the pivot (**01 score**)

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b) The plank balances horizontally when a boy pushes down with a force, F at a distance of 1.6 m from the pivot. State and use the principle that enables balancing to find the size of the force, F. (**03 scores**)

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9. An aluminium saucepan with a plastic handle contains cold water placed on a hot plate.

a) Explain why the pan is made from aluminium but handle is made from plastic (**02 scores**)

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b) If the hot plate is switched on and as the temperature of water increases, explain the cause of increase in temperature. (**01 score**)

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c) What is the value of boiling point of water in Kelvin scale?(**01 scores**)

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10. In a certain village, a man wanted to sell scrap but has a challenge of using the measuring instrument shown below. He needs an explanation on how to use the instrument to find the mass of the scrap. Write down how you can help him solve this problem. (**04 scores**)

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SECTION B (40 Scores)

Attempt strictly **two** items in this section on separate answer sheets provided.

11. Moses wants to construct a factory at a certain hill in his village. He wishes to use water as the major coolant in the machines he chooses to use. His friend Anthony notifies him that he should be careful with the height to which his factory is to be established. Anthony convinces him that he should account for the altitude because as you go higher and higher the atmospheric pressure decreases. Atmospheric pressure determines the boiling point of a liquid.

Anthony warns Moses that he needs to first measure the height of the hill and knows the pressure at the top of the hill.

Support materials
• A tube of about 1 metre
• Mercury in a beaker
• Metre rule

Task

Help Moses measure the height of the mountain by using the knowledge of atmospheric pressure, and also help him know further the challenge he will face in case he has no other option of location. (**20 scores**)

12. <u>**New vision**</u>

Sad news!!!   **Sad news!!!**   **Sad news!!!**

Today in the morning at Homeland primary school, 2 pupils were found dead in a down tank which is 10 metres long below the ground. The head teacher was arrested immediately and the vision group interacted with him and says that the pupils were fetching water from the tank using a rope tied on the jerrycan which had a capacity of containing water up to the weight of 10kg. The government is taking a step of closing the school tomorrow and to arrest all the teachers.

Support materials

A rope.

The same jerrycan

A metallic bar OR a long moderate piece of wood

Wheel of the bicycle.

Task

a) Help the school come up with a simple machine they can use at the moment to protect it from being closed. Show all the necessary steps and illustration of this machine. Also guide the pupils on how to operate the machine using the least possible energy. (**10 scores**)

b) Use the knowledge of application of atmospheric pressure, write a simple report to L.C.V of Pallisa district, and include a machine you would recommend the government to install at the school to solve the problem completely. Give the reason(s) for the choice of the machine. (**10 scores**)

13. a) A musician of mass 60kg putting on high heels is found to make contact area with the ground of 0.002m^2 per heel. Determine the total pressure she would exert when;

   i) Standing on both feet (**03 scores**)

   ii) Walking (**02 scores**)

c) What one danger can you identify concerning the choice of shoes by the musician in (a) above towards;

   i) Herself (**01 score**)

   ii) The surface (floor) she walks on (**01 score**)

d) A student pushes a drawing pin into wooden board. The area of contact of pin with the finger is 5.0×10^{-5} m². The student pushes with a force of 26N and pin has a very small mass.
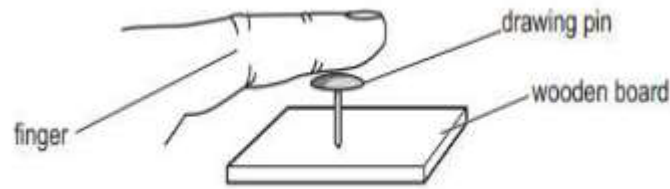
    i)   Calculate the pressure exerted by the finger on the drawing pin
                                           (02 scores)
    ii)   Explain why the drawing pin penetrates into the wooden board but not into the finger. **(02 scores)**

d) You are provided with a 1.5L mineral water bottle, cello tape, water, sharp pin and basin. Explain how you can demonstrate and conclude the effect of depth on pressure in liquids **(05 scores)**

e) Explain why after sometime a person carrying a heavy parcel using a thin string feels pain. **(04 scores)**

14. A certain family stays near the **murram road** and a **school**. Every day, the family receives dust raised by moving vehicles from the road and the bad smell from the school pit latrines. In the morning hours, the dust is not so much and the smell from the pit latrine is not so much either. But these conditions worsen around midday on hot sunny days. The family is disgusted by these conditions. They don't know the cause of these conditions.

As a scientist (researcher), write a comprehensive message to this family explaining what causes the above conditions and possible ways of solving the above problem. **(20 scores)**

END