SESEMAT MBARARA REGION

2023 END OF YEAR SARB EXAMINATIONS

NEW LOWER SECONDARY CURRICULLUM

S.3 Physics

Time: 2 ¼ hours

Name:..... Signature.....

School:..... Stream.....

INSTRUCTIONS

- The paper consists of two sections A and B.
- Section A consists of 10 structured questions. Attempt all questions in this section by writing the answers in the spaces provided.
- Section B consists of six extended short essay questions. Attempt any four questions from this section. Answers to this question must be written on separate answer sheets. All questions in this section carry equal marks.

Where necessary, use;

- Acceleration due to gravity, g = $10ms^{-2}$

SECTION A (40 scores)

1. A group of students in a secondary school entered a school physics laboratory for a physics lesson. They found the following in the laboratory; metre rule, beam balance, stop clock, spring balance, measuring cylinder, beaker and so many others.

Beaker

Graduated Cylinders

Double Pan Balance

Test Tubes

Meter Stick

a) State the general name given to what the students saw in the laboratory. **(1 score)**

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b) What do the above listed measure? **(3 scores)**

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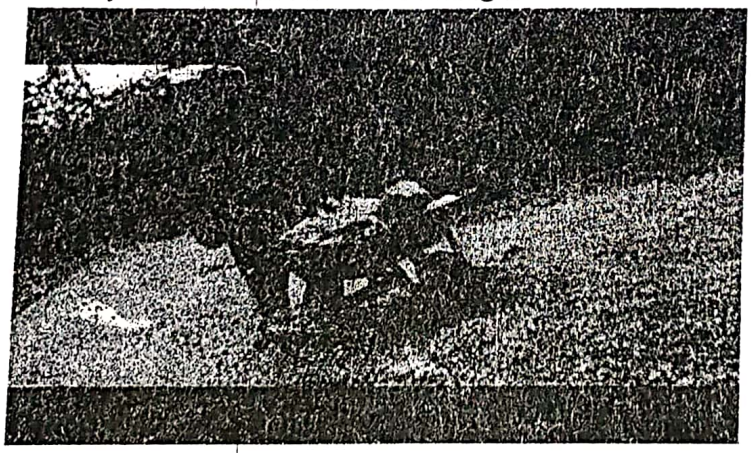
2. At a construction site, a loaded wheel barrow weighing 600N is pushed up an inclined plane by a force of 150N parallel to the plane. The plane rises 50cm for every 400cm length of the plane as shown below. Find the velocity ratio and mechanical advantage. **(4 scores)**



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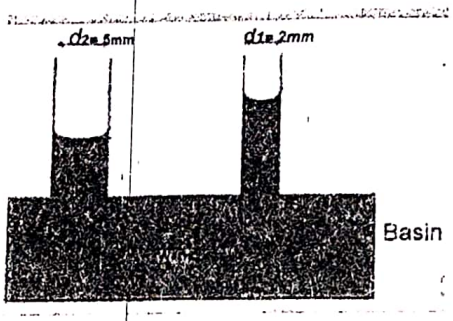
3. Two capillary tubes A and B of diameters 2.00mm and 5.00mm are dipped up-right in a basin full of water and clamped.



a) With the aid of a diagram, show what will be observed after some time **(2 scores)**

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b) Suggest an application of capillarity in your daily life. **(1 score)**

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c) What is the use of a damp proof course in the construction of buildings? **(1 score)**

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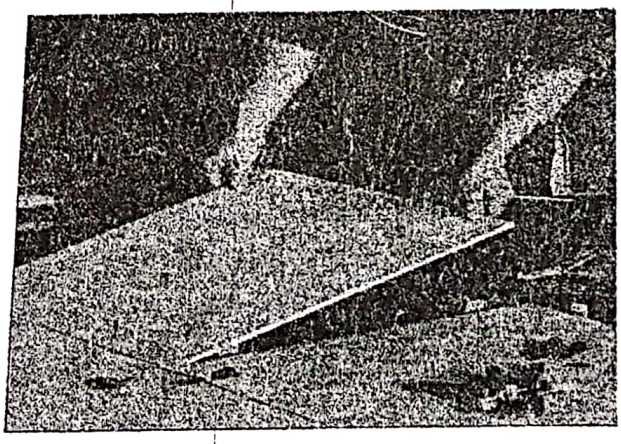
4. (a) Your Secondary School wants to tile a dinning hall measuring 40m by 20m.



If a tile measures 30cm by 10cm, how many tiles are required? **(4 scores)**

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5. (a) Most substances expand when they are heated. A balloon expands many times larger when it is heated. Solids expand so little that it is hard to measure. Gases expand almost 2000 times more than solids when they are heated over the same amount of temperature.

   a) Explain why this happens. **(2 scores)**

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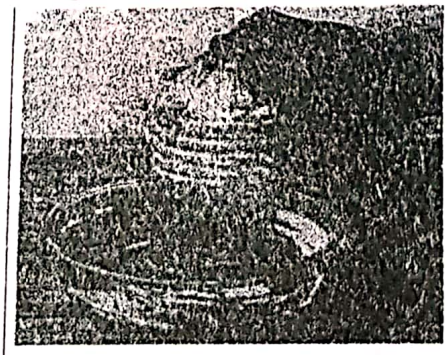
   b) An inflated balloon is tied at the mouth of a bottle and the bottle is placed on ice-cold water as shown in the picture below.



State and explain what happens to the balloon. **(2 scores)**

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6. (a) Elvin and Edgar are senior three boys in a certain school. They happened to be in two different football teams. Elvin had a mass of 50kg and was running after a ball at a velocity of $5ms^{-1}$. He collided with Edgar of mass 30kg who was stationary. After their collision in a pitch, the two boys moved separately in the same direction. If Elvin moved with a velocity of $3ms^{-1}$ after collision, calculate the velocity of Edgar after collision. **(3 scores)**

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(b) State the principle of conservation of linear momentum. **(1 score)**

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7. In an experiment to verify Hooke's law, a student used a pointer, spring, masses and retort stand. The initial pointer position was observed to be 18.0cm. When a mass of 50g was hung on the spring, the new pointer position was 38.0cm. What mass would be hung on the spring to give the final pointer position of 68.0cm. **(4 scores)**

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8. A teacher provided an optical pin, manila paper cellotape, a burning candle and tracing paper to learners during a physics lesson. He described the structure of a pin hole camera and asked them to construct one.

a) Draw the structure of such a camera. **(2 scores)**

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b) A candle of height 10.0cm was placed at a distance 15.0cm infront of the pin hole camera in 8(a) above. The length of the camera designed was 12.0cm. what was the size of the image obtained? **(2 scores)**

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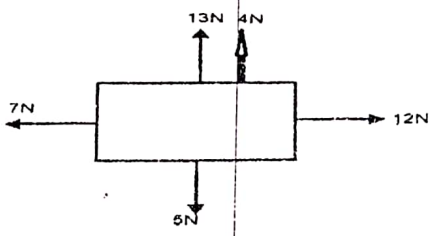
9. Different forces are acting on the object in different directions as shown in the figure below.



a) Calculate the resultant force **(2 scores)**

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b) If the resultant force in (a) above moves the body at a rate of $6.5ms^{-2}$, obtain the mass of the object. **(2 scores)**

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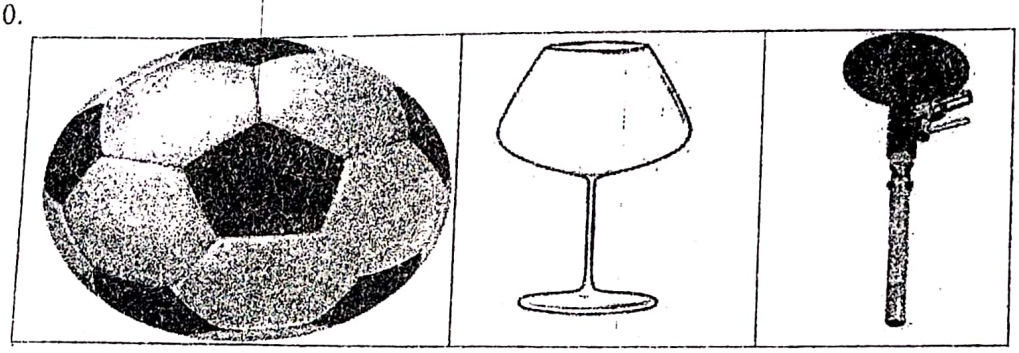

(i) (ii) (iii)

A ball, wine glass and Bunsen burner are placed on a table and are at rest as shown in the diagram above. When each was given a slight push, the following were observations.

The ball rolled continuously without stopping, the wine glass moved from its position but returned to its original position, their Bunsen burner toppled and rested side ways on the table.

a) Using the knowledge of stability, identify the type of equilibrium in figures (i), (ii) and (iii) above. **(3 scores)**

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b) How does area of surface of contact of a body affect its stability?

(1 score)

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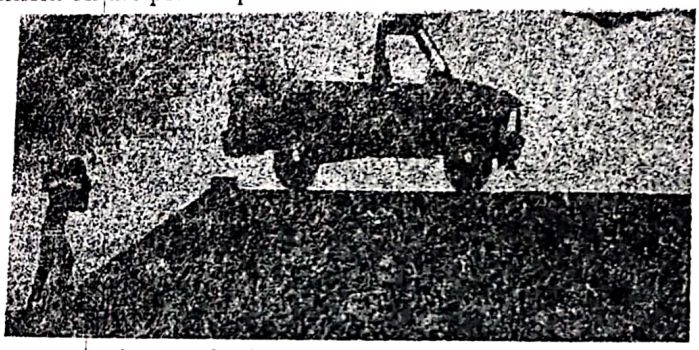
SECTION B (40 scores)

11. A factory worker, lifts up a bag of cement of mass 50kg, carries it horizontally then up a ramp of length 6.0m onto a pick-up and finally drops the bag of cement on the pick –up.



a) Explain the energy changes in the various stages of the movement of the worker.

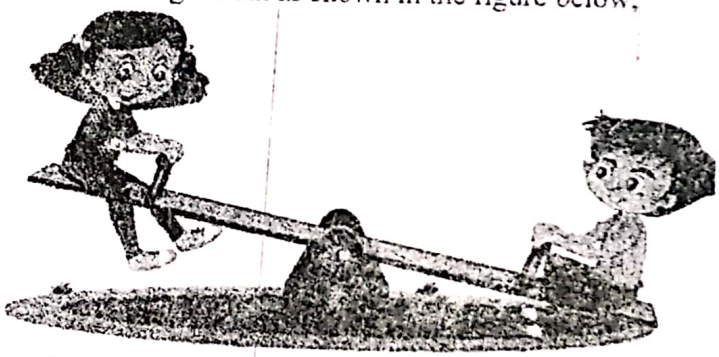
b) If the worker has a mass 60kg and the ramp is 1.5m high, find the;

i) Velocity ratio

ii) Efficiency of the inclined plane if the mechanical advantage is 3.

(10 scores)

12. Two students Joy and James are playing a game on a horizontal wooden beam of length 20m as shown in the figure below;



Joy has a mass of 45kg and James does not know his mass. If the wooden beam balances horizontally when Joy is 12m from the balancing point and James is 8m from the balancing point,

a) What is the;

i) mass of James?

ii) weight of James?

iii) reaction at the balancing point?

b) State the principle of moments for the body to be in equilibrium.

c) Where is the principle stated in (b) above applied in every day life?

(10 scores)

13. (a) Some learners of S.2 had a plastic bottle filled with water. They had an argument on where the pressure of water in that bottle acts most and where it acts least. As a learner in S.3 describe a suitable experiment you would form to help them prove the correct prediction.

(b) If you swim deep in a swimming pool to a point with a depth of 8.0m in water of density $1000kgm^{-3}$, calculate the pressure you will be experiencing at that point **(10 scores)**

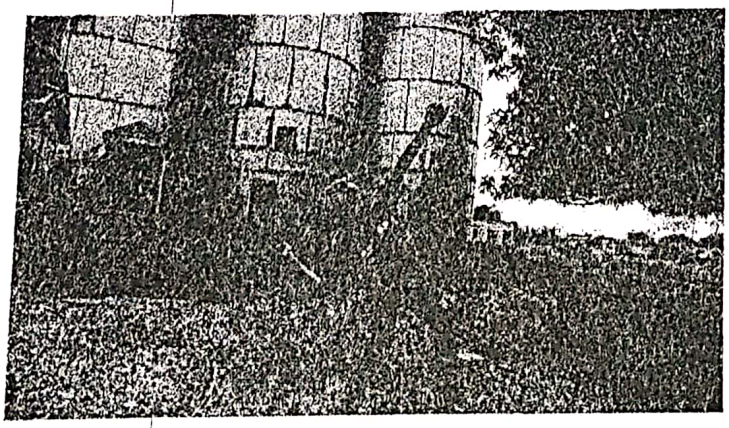
14. Mary a student of S.2 found a piece of metal on her way home. She put it in her bag that contained a razor blade, small pins and small nails. The next day, she found out that these materials were attracted to this piece of metal. And she was surprised and showed it to her fellow students at school.

a) As a student of Physics, help Mary identify this piece of metal. **(1 score)**

b) After identifying the piece of material in (a) above, it was tied on a retort stand using a piece of thread and its North pole kept pointing in one direction on the earth. State the direction in which it is pointing on the earth and explain why it is so.

c) Draw the magnetic field lines of the earth. **(10 scores)**

15. A senior one student was standing under the mango tree and he wanted to eat a mango fruit.



The fruit was far upwards from the boy. He fired vertically upwards a stone with a velocity of $45ms^{-1}$.

a) Find how high the stone goes and the time it takes to reach there.

b) If the mango fruit is 105m from the ground level, did the boy hit the mango? Explain your answer. **(10 scores)**

16. (a) A teacher wishes to use a metal sphere that is positively charged to illustrate the concept of charges in a physics lesson. He does not find any that is charged in the physics laboratory. Using the knowledge of charging bodies by induction, help the teacher as to how he can achieve this.

(b) If in your group in the same physics lesson the teacher provided you with a Gold leaf electroscope, explain to the group members how you would use this apparatus to test the charge acquired by the metal sphere in (a) above.

(10 scores)

END