

NAME: ..... STREAM: .....  
SIGNATURE: ..... DATE: .....

NEW LOWER SECONDARY SCHOOL CURRICULUM  
(NLSC)  
RESOURCE PAPER  
535/1 PHYSICS FOR S.4  
Paper 1

Duration: 2 Hours

INSTRUCTIONS TO CANDIDATES:

*Write your name, stream, signature and the date clearly in the spaces provided.*

*This paper is made up of two sections, section A and section B.*

*Section A has three (3) short scenarios (items); responses are to be written in the spaces provided.*

*Section B has four (4) extended scenarios (items); with two (2) sub-sections; I & II. The candidate is required to respond to one scenario (item) from each sub-section.*

*Untidy and crossed work will lead to reduction in the scores.*

*Show all working clearly with relevant illustrations (examples).*

*These values of the following physical quantities may be useful to you:*

- |                                    |   |                                    |
|------------------------------------|---|------------------------------------|
| • Acceleration due to gravity, g   | = | $10\text{ms}^{-2}$                 |
| • Density of water                 | = | $1000\text{kgm}^{-3}$              |
| • Specific heat capacity of water  | = | $4200\text{Jkg}^{-1}\text{K}^{-1}$ |
| • Specific heat capacity of copper | = | $400\text{Jkg}^{-1}\text{K}^{-1}$  |
| • Speed of electromagnetic waves   | = | $3.0 \times 10^8\text{ms}^{-1}$    |
| • Speed of sound in air            | = | $320\text{ms}^{-1}$                |

### SECTION A

Respond to all the items (scenarios) in this section, and show your working clearly

1. Light is a form of energy that is produced from very hot bodies and causes sensation of vision on falling into our eyes. Light belongs to a family of waves called electromagnetic waves. The figure below shows light waves moving from point O to P in 8s.

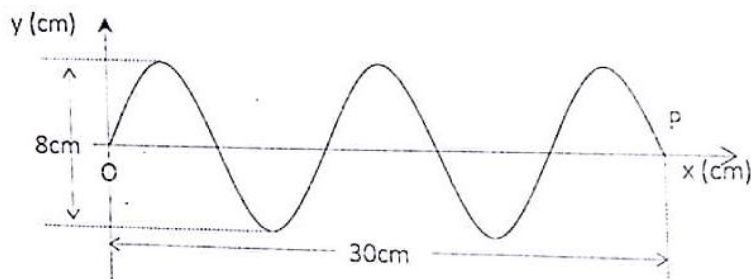
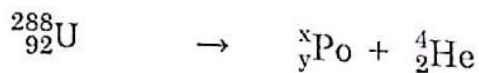


Figure 1

#### TASK:

As a learner of physics in S.4; state two properties that show that light is an example of electromagnetic wave; and from the figure 1, state or calculate the amplitude, wave length and hence determine the frequency and velocity of the wave.

2. In one of the themes, of modern physics, under the chapter atomic model, the learners were informed of the words like; Atomic number, atomic mass, isotopes and radioactivity. In one of the lessons the teacher wrote down the equation below on the chalk board;



The learners tried to recall the meaning of the words and complete the equation but were not able to do so.

#### TASK:

As a learner of physics in S.4, help your fellow learners give the meaning of the underlined words and complete correctly the equation written by the teacher on the chalk board.

3. "The sun is the nearest stars to the earth." The Dog star (Sirius) is the brightest star in the night sky." Those two phrases were said by the teacher in one of the lessons. The learners were interested in the meaning of words like absolute brightness, visual magnitude and galaxies in relation to the stars; also, they were interested to know why the sun appears yellow; what determine the brightness of the stars. The learners debated but in vain and could not come up with a conclusion.

**TASK:**

As a learner of physics in S.4, help your fellow learners give the meaning of absolute brightness, visual magnitude and galaxies; explain why the sun appears yellow and the factors that determine the brightness of the stars.

**SECTION B**

Respond to one scenario (item) from each sub-section.

**Sub-section I**

**(ELECTRICITY AND MAGNETISM)**

Respond to only one scenario (item) from this section.

4. Electricity has many applications in the day-to-day life. Two applications of electricity include; performing experiments in the laboratory using dry cells and other components while the other is in making magnets. In performing experiments in the laboratory, a learner was provided with the circuit diagram below in figure 2.

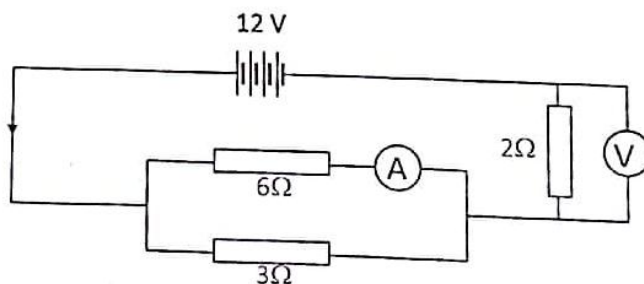


Figure 2

The learner was asked to determine the ammeter reading and voltmeter reading but could not do much.



**TASK:**

As a learner of physics in S.4, help the learner to determine the ammeter reading and voltmeter reading; outline factors that affect resistance of a metal wire and describe the electrical method of magnetizing a steel bar.

5. Electricity can also be generated by friction, for instance when clouds move, they rub against each other; and the discharge is directed to the earth in the name of lightning when the charged clouds meet. In one of the communities, a person constructed a flat but did not install the lightning conductor. When the person was told of the importance of the lightning conductor, the person insisted that the earth is a magnet and would protect the flat from lightning. This annoyed many people and the argument went on till the end of the day.

**TASK:**

As a learner of physics in S.4, help the community member describe how the lightning conductor protects the building; give and explain the colour codes in house wiring; explain why the earth is considered a magnet and draw the magnetic field lines for a bar magnet with its axis in the magnetic meridian, and its south pole pointing north.

**SUB – SECTION II  
(MECHANICS AND HEAT)**

Respond to only one scenario (item) from this sub – section.

6. In one of the physics lessons, S.4 learners were investigating the relationship between energy changes when a metal is dropped from a height above the ground and the specific heat capacity of a metal. The learners released a metal block of mass 400g from a height of 10m above the ground. On hitting the ground, the learners quickly transferred it into a well lagged copper calorimeter of mass 50g at 20°C containing 400g of water at 20°C. If on hitting the ground, 80% of its total energy was converted to heat energy and the final temperature of the calorimeter and its content rose to 70°C. The learners could perform the investigation but were not able to identify the energy changes and determine the specific heat capacity of the metal.

**TASK:**

As a learner of physics in S.4, help your fellow learners identify the energy changes from the point of release of the metal; give the meaning of specific heat capacity and determine the specific heat capacity of the metal.

7. In one of the scientific investigations performed by the learners of S.4, to verify Hooke's law, using a steel spring the following results were obtained.

• Original length of the spring	=	5.0cm
• Mass suspended from the hook	=	400g
• New length of the spring	=	13.0cm

While in another scientific investigation, the learners observed that the valve of the bicycle tube warms up when air was being pumped into the bicycle tube. In both scientific investigations the learners could not come up with clear conclusion.

**TASK:**

As a learner of physics in S.4, help your fellow learners determine the strain produced on the steel spring and the force constant of the steel spring; identify conditions for Hooke's law; explain why the valve of the bicycle tube warms up when air was being pumped into the bicycle tube; give the meaning of pressure and show the relationship between pressure and altitude in relation to boiling of the liquid.

**END**