



GOVERNMENT OF SAMOA

STUDENT EDUCATION NUMBER									

Samoa National Junior Secondary Certificate

PHYSICS

2023

QUESTION and ANSWER BOOKLET

Time allowed: 3 Hours & 10 minutes

INSTRUCTIONS

1. You have 10 minutes to read **before** you start the exam.
2. Write your **Student Education Number (SEN)** in the space provided on the top right-hand corner of this page.
3. **Answer ALL QUESTIONS.** Write your answers in the spaces provided in this booklet.
4. If you need more paper to write your answers, ask the supervisor. Write your SEN on all extra sheets used and clearly number the questions. Attach the extra sheets to the appropriate places in this booklet.
5. **All the formulas required are provided on page 18.**

STRANDS		Pages	Time (min)	Weighting
STRAND 1	ENERGY (WAVES)	2 – 5	45	25
STRAND 2	ELECTRICITY	6 – 9	45	25
STRAND 3	MAGNETISM	10 – 13	45	25
STRAND 4	FORCES AND MOTION	14 – 17	45	25
TOTAL			180	100

Check that this booklet contains pages 2 - 19 in the correct order and that none of these pages are blank.

HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Questions 1 to 3, choose and write the LETTER of the correct answer in the box provided.

1. Heat is a form of energy. State the derived S.I unit of Heat.

- A. Calories
- B. Joules
- C. Horsepower
- D. Power

SL 1

2. Which of the following is **NOT** true about insulator?

- A. It is a poor conductor of heat and electricity.
- B. It is a material in which heat and electricity flow freely.
- C. It consists of a huge number of free electrons.
- D. It is a good conductor of heat and electricity.

SL 1

3. The boiling point of water in degree Celsius is 100° . What is the boiling point in Kelvin?

- A. 173 K
- B. 373 K
- C. 0 K
- D. 273 K

SL 1

4. State and describe the heat transfer process that occurs in boiling water in an electric kettle.

SL 3

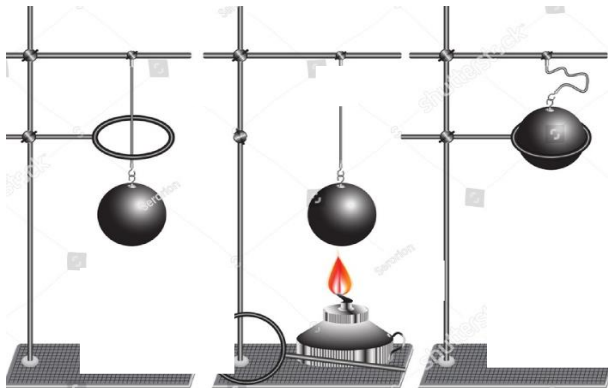
5. Describe how temperature difference affects the rate of heat transfer.

SL 2

6. Explain the difference between heat and temperature.

SL 2

The diagram below shows an Experiment done by Tulia to investigate the Expansion of Metals.

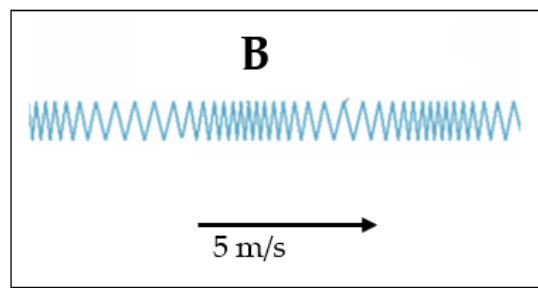
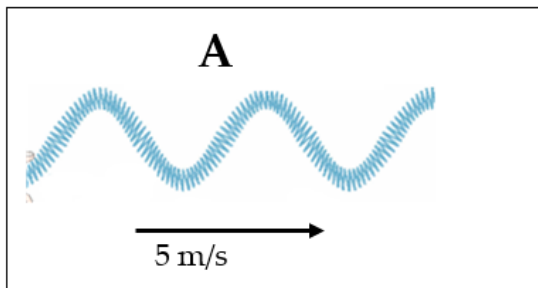


7. Discuss the results and observations of the above Experiment.

SL 4

“A Wave is a disturbance that transfers energy from point to point in a medium.”

Use the above definition of wave and the diagrams given below to answer Questions 8 to 10.



8. Name the **TWO** types of wave label A and B on the above diagrams.

A: _____

B: _____

SL 2

9. Fill in the table below to show which direction the particles of the medium and the energy carried by the wave move.

Property/Behavior	Wave A	Wave B
Direction where particles of the medium moves.		
Directions where the energy move.		

SL 4

10. Wave A has a period of 0.05s. Calculate its wavelength.

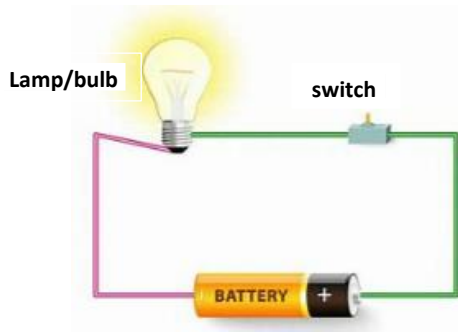
SL 3

11. State the frequency hearing range of human.

SL 2

For Questions 12 and 13, choose and write the LETTER of the correct answer in the box provided.

Use the circuit diagram below to answer Question 12 to 14.



12. Which of the following is the symbol for the switch component?

- A.
- B.
- C.
- D.

	SL 1

13. Which of the following is **TRUE** about the battery?

- A. The source of electricity in the circuit.
- B. Convert electricity into light.
- C. The battery has two positive terminals.
- D. Control the flow of charges in the circuit.

	SL 1

14. “The circuit diagram above represents a bulb connecting in parallel with the battery.”

TRUE or **FALSE** ?

SL 1

15. Construct a simple open **series** circuit with 1 battery, 1 bulb, open switch and wires. Use **symbols** for the electrical components.

SL 2

16. When an identical bulb is added parallel to the first bulb in the circuit in Question 15, state if the brightness of each bulb would change or remains unchanged. Give a reason for your answer.

SL 2

17. Explain why a screwdriver handle used by electricians is always covered with rubber material.

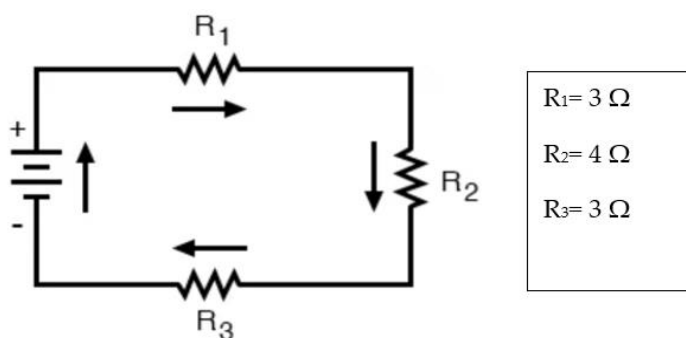


SL 3

18. State **TWO** advantages and **ONE** disadvantage of a Series Circuit.

SL 3

Use the diagram below to answer Question 19.



19. Calculate the voltage through R_2 if the total voltage in the circuit is 12V.

SL 4

20. Complete the table to compare the uses and how energy is stored in dry cell and a lead acid cell.

Type of cell	Dry cell	Lead-Acid cell
Uses		
How energy is stored.		Energy is stored in form of liquid acid electrolytes.

SL 3

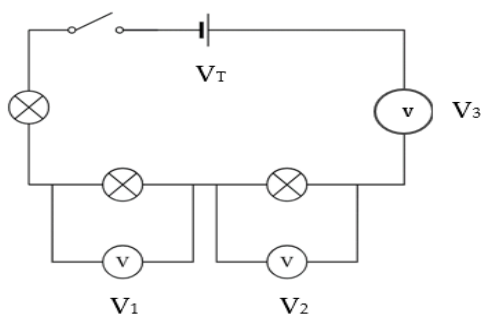
21. Choose the correct words from the list provided to fill in the spaces in the statement below.

List of words: *current, potential difference, resistance, series, parallel.*

A voltmeter is an instrument connected in _____ with an electrical component to measure its _____.

SL 2

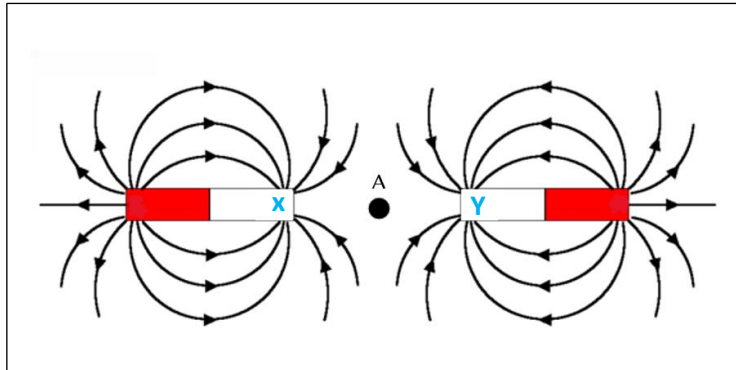
22. Form a mathematical expression to demonstrate the relationship of V_T , V_1 , V_2 , and V_3 in the circuit below.



SL 3

For Questions 23 and 24, write the letter of your BEST answer in the box provided.

Use the diagram below to answer Questions 23 – 24.



23. Which of the following is **TRUE** about the two ends label **X** and **Y**?

	X	Y
A.	South Pole	North Pole
B.	South Pole	South Pole
C.	North Pole	South Pole
D.	North Pole	North Pole

	SL 1

24. Point A as labeled in the diagram is known as:

- A. decimal point.
- B. point of life.
- C. neutral point.
- D. point of magnet.

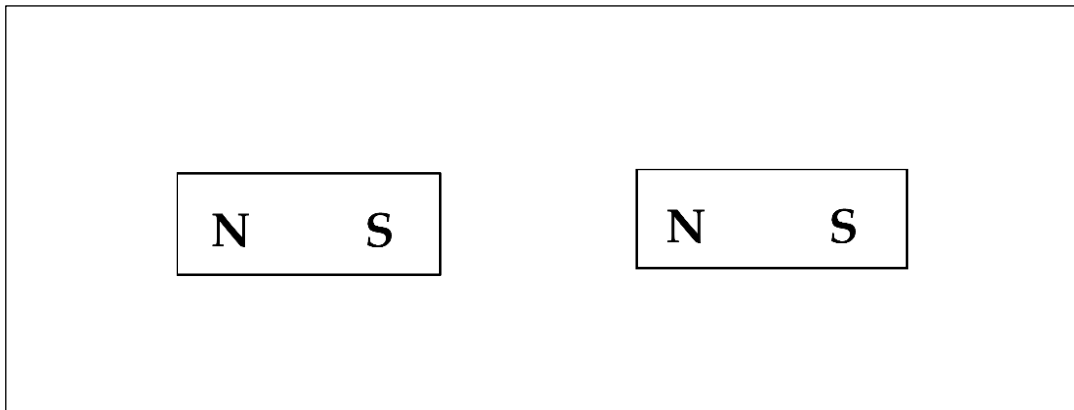
	SL 1

25. The magnetic field of the Earth is not always parallel to its surface because of its:

- A. shape.
- B. mass.
- C. weight.
- D. speed.

	SL 1

26. Two bar magnets are placed close to each other as shown. Draw the magnetic field lines around the magnets, clearly showing if they attract or repel.



SL 2

27. Describe the process of magnetic Induction.

SL 2

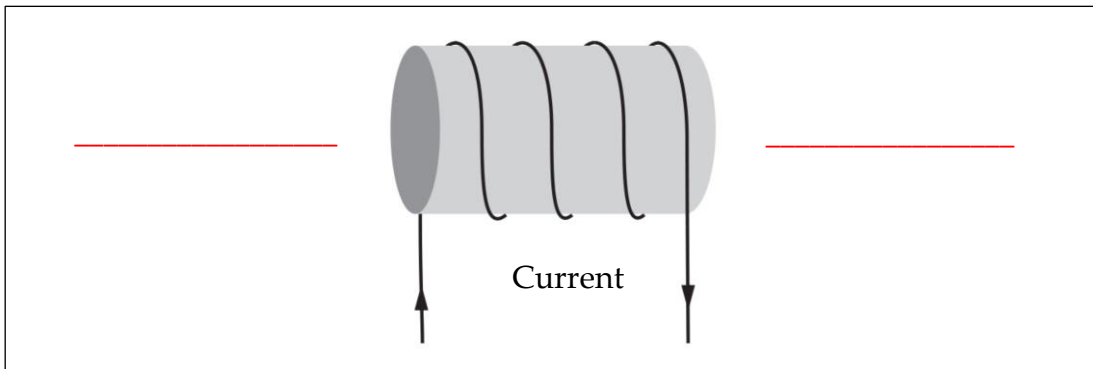
28. Explain how the stroking method for making a magnet works. You can draw a diagram to demonstrate your answer.

SL 3

29. Define electromagnet and state **TWO** ways to increase its strength.

SL 3

30. Label on the diagram the two poles of the electromagnet shown.



SL 2

31. Explain **THREE** differences between temporary and permanent magnets.

Temporary Magnet	Permanent Magnet

SL 3

32. List **THREE** uses of permanent magnets in everyday life.

SL 3

33. You are given an iron nail, a 12V power supply, a long piece of insulated copper wire and some metal paper clips. You are instructed to follow the procedures below:

1. Wrap the insulated copper wire around the iron nail.
2. Connect the ends of the wire to the power supply using the DC terminals.
3. For electric current to flow through the wire, plug in the power supply, adjust to 6V and turn it on.
4. Now bring the metal paper clips close to the iron nail and observe what happens.
5. Increase the voltage to 10V and observe what happens.

Write observations you would note at step 4 and step 5 and write what you can conclude from your observations.

Observation: _____

SL 4

Conclusion: _____

For Questions 34 to 36, write the letter of your BEST answer in the box provided.

34. Which of the following is a scalar quantity?

- A. Velocity
- B. Displacement
- C. Speed
- D. Acceleration

SL 1

35. What is the correct SI unit for acceleration?

- A. m/s
- B. m^2/s
- C. ms^2
- D. m/s^2

SL 1

36. The buoyant force acting on a floating body is:

- A. vertically downwards.
- B. vertically upwards.
- C. horizontal on both the sides.
- D. both horizontal and vertical.

SL 1

37. A bicycle moving on a straight road at constant speed is an example of a linear motion. Differentiate linear and nonlinear motion in terms of acceleration and give one example of a nonlinear motion in everyday life.

Differences:

SL 3

Example:

38. Measurement is a practical exercise of determining the magnitude of something. List the important materials for measuring the distance and time it takes for a student to run from one end of the field to the other.

SL 2

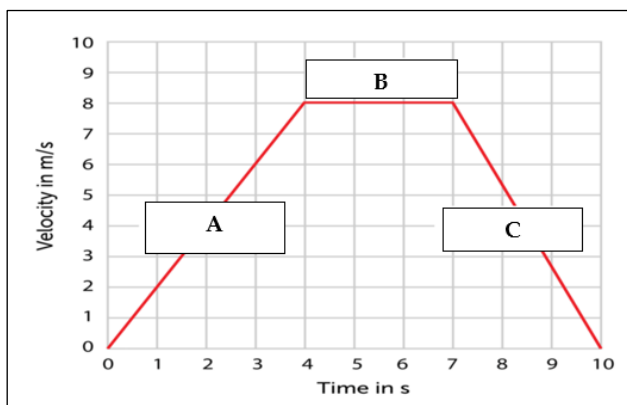
39. Sketch a distance vs time graph to show an object that is moving at a constant speed for 2 seconds.

Distance vs time Graph

SL 2

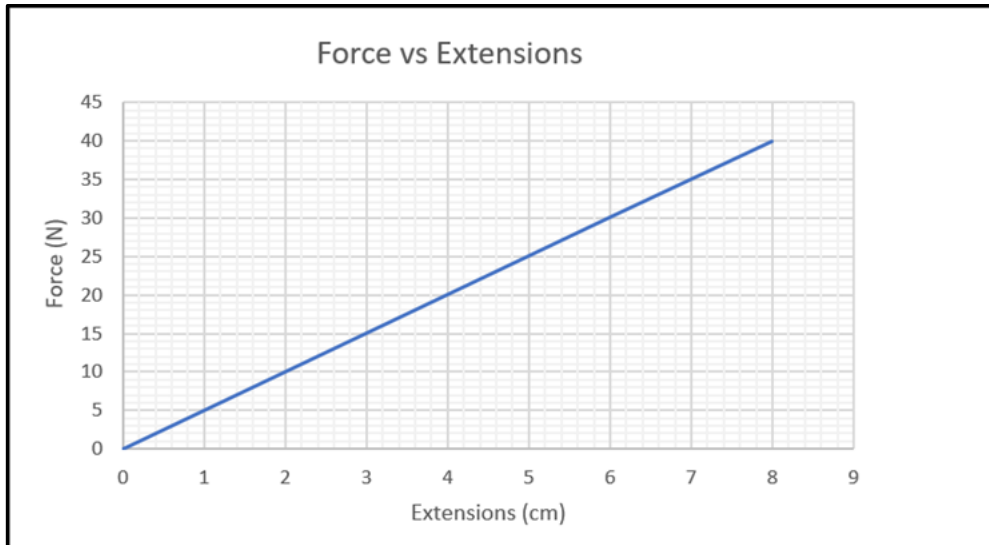
40. The graph shown below is a Velocity vs Time graph. Match the slopes labeled A, B, and C with descriptions of what they represent.

SLOPES	Descriptions
A	Acceleration is zero. Object is not moving.
B	Acceleration is positive. Increase in velocity.
C	Acceleration is negative. Decrease in velocity.



SL 3

41. The graph below shows the extension in length of a rubber band when some force is applied to it.



- (a) Calculate the slope of the graph and state what this slope represents.

SL 4

- (b) Explain how the force affects the extension of the rubber band.

42. If your weight is 170N and the total area of the soles of your feet is 0.25m^2 , calculate how much pressure you would exert on the ground.

SL 2

43. Describe atmospheric pressure.

SL 2

44. An object of mass 5 kg displaces 1000 cm^3 of water when fully immersed in water. Calculate the volume of the body and the apparent weight of the object in water. (Take density of water 1000 kgm^{-3}).

SL 4

FORMULAE SHEET

Wave (Energy)

$$Q = mc\Delta T$$

$$f = \frac{1}{T}$$

$$T = \frac{1}{f}$$

$$v = f\lambda$$

Electricity

$$V = IR$$

$$R_T = R_1 + R_2 + R_n$$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_n}$$

Forces and Motion

$$v = \frac{d}{t}$$

$$F = ma$$

$$a = \frac{\Delta v}{\Delta t}$$

$$\text{Pressure} = F/A$$

$$v = u + at$$

$$\text{Density} = m/V$$

$$v^2 = u^2 + 2as$$

$$\text{Weight} = mg$$

$$s = ut + \frac{1}{2}at^2$$

$$F_b = \rho gV$$

$$s = \left(\frac{v + u}{2}\right)t$$

Constants

$$c_w = 4200 \text{ J/kg}^{\circ}\text{C}$$

$$g = 10 \text{ ms}^{-2}$$

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SNJSC PHYSICS

2023

(For Scorers only)

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STRAND 1	ENERGY (WAVES)	25			
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TOTAL		100			