



# THE KENYA NATIONAL EXAMINATIONS COUNCIL

**ST104**

**PHYSICS**

**2026**

**School Based Assessment**

**Grade 10**

**Written Test**

**Time: 2 hours**

**Name:** \_\_\_\_\_ **Assessment No.:** \_\_\_\_\_

**School Name:** \_\_\_\_\_ **Signature:** \_\_\_\_\_

## Instructions

- (i) This paper consists of two sections: A and B.
- (ii) Section A consists of 10 multiple-choice questions, while Section B consists of 7 structured questions.
- (iii) Answer all questions in both sections.
- (iv) In Section A, mark or circle the correct option. No separate answer sheet is provided.
- (v) In Section B, write your answers in the spaces provided.
- (vi) All answers in Section B must be written in English.

## Teacher's Use only

| Task          | Question       | Marks     | Learner's Score |
|---------------|----------------|-----------|-----------------|
| <b>Task 1</b> | 11             | 07        |                 |
| <b>Task 2</b> | 1 & 12         | 13        |                 |
| <b>Task 3</b> | 13             | 10        |                 |
| <b>Task 4</b> | 14             | 08        |                 |
| <b>Task 5</b> | 2 & 15         | 09        |                 |
| <b>Task 6</b> | 5 & 16         | 13        |                 |
| <b>Task 7</b> | 3, 4 & 17      | 10        |                 |
| <b>Task 8</b> | 6,7, 8, 9 & 10 | 05        |                 |
|               | <b>Total</b>   | <b>75</b> |                 |

**This paper consists of 11 printed pages. Confirm that all the pages are present and that no question is missing.**

### SECTION A (10 Marks)

1. Engineer's club plans to use a waterproof camera to record videos at the bottom of a deep-water tank during an experiment. Before lowering the camera into the tank, the learners decided to strengthen its outer casing. Why do you think this is necessary?
  - A. To prevent damage from high water pressure as it sinks.
  - B. To make the camera sink faster through the water.
  - C. To reduce the effects of low temperatures on the camera.
  - D. To protect the camera from pressure caused by surface waves
2. You are provided with two laboratory stands to investigate which one is more stable when both are subjected to the same disturbance. Which of the following actions would provide you with **direct evidence** for your conclusion?

Determine and compare the:

  - A. positions of the loads on the two stands
  - B. distances between the supports of the two stands.
  - C. forces acting on the two stands
  - D. positions of the centre of gravity of the two stands.

Read the following newspaper extract and answer questions 3, 4 and 5.

|               |                           |               |
|---------------|---------------------------|---------------|
| July 24, 2026 | Truth. Service. Progress. | Sunday P25.00 |
|---------------|---------------------------|---------------|

**BREAKING NEWS!**

## Nuclear Power Plans Raise Questions in Kaloi Village, Philipino County – 2026

By MARIA L. SANTOS

Plans to establish Philipino's first nuclear power plant have attracted growing interest among residents.

The plans have, however, raised questions among residents about radioactivity, the safety of workers and the possible effects of radiation on people and the environment.

During a public meeting, engineers explained that people are already exposed to background radiation even without the plant. They assured residents that the nuclear facility would be carefully monitored to control any additional exposure to radiation.

3. The newspaper reports that *“During a public meeting, engineers explained that people are already exposed to background radiation even without the nuclear power plant.”*

In this context, which of the following explains what is meant by the term *background radiation*?

  - A. Radiation in the background environment following releases from human activities.
  - B. Radiation produced through the intentional use of radioactive materials in medicine.
  - C. Radiation from naturally occurring sources to which people are exposed.
  - D. Radiation generated by nuclear facilities that add to the radiation already present.

4. During the meeting, engineers assured residents that the proposed nuclear plant will be closely monitored. Which of the following actions would give the **strongest** evidence that the operators are addressing residents' concerns about radiation safety?
- A. Holding regular meetings with residents to explain the facility and answer their concerns.
  - B. Giving them information about nuclear power and its importance for electricity supply.
  - C. Training workers on radiation safety measures and carrying out regular checks of the facility.
  - D. Measuring radiation levels regularly and using the results to improve safety measures
5. One of the residents also asked to know how the energy produced by the nuclear plant would be converted into electricity supplied to their homes. Which of the following sequences provides the **correct** response the engineers would give?
- A. Nuclear energy → Thermal energy → Electrical energy → Kinetic energy → Mechanical
  - B. Nuclear energy → Thermal energy → Kinetic energy → Mechanical energy → Electrical
  - C. Thermal energy → Nuclear energy → Kinetic energy → Mechanical energy → Electrical
  - D. Nuclear energy → Mechanical energy → Thermal energy → Kinetic energy → Electrical
6. Jenipher, a customer, pulls a plastic shopping bag from a stack and observes that the bag clings to her clothing. The shop attendant explained that the bag becomes electrically charged when it is separated from the other bags in the stack. Which of the following explains this observation?
- A. Protons are transferred between the bag and the other bags, resulting in an imbalance of charge.
  - B. Electrons are transferred between the bag and the other bags, resulting in an imbalance of charge.
  - C. Neutrons are transferred between the bag and the other bags, resulting in an imbalance of charge.
  - D. Positive and negative charges are created in the bag when it is separated from the other bags.
7. A group of Grade 10 learners visited an electronics repair shop, where they found a technician testing resistors on a television set and recording the values of their resistance. The technician asked them to explain what they understood by the term *resistance*. The following are some of the responses the learners gave:
- (i) It shows how the resistor opposes the flow of electric charge.
  - (ii) It shows how much energy is transferred to each unit of electric charge.
  - (iii) It shows how fast electric charge flows through a resistor.
  - (iv) It shows how fast electrical energy is transferred.
- Which response(s) was correct?
- A. Responses 2 and 4 only
  - B. Response 3 only
  - C. Responses 1 and 3 only
  - D. Response 1 only

8. The figure shows one of the electrical components used in wiring.



Which of the following shows the importance of the part labelled X?

- A. Prevents current from flowing into the surrounding material.
- B. Allows current to flow between the conducting parts.
- C. Increases the current flowing through the conducting parts.
- D. Reduces the resistance of the conducting parts.

**Use the following information to answer questions 9 and 10**

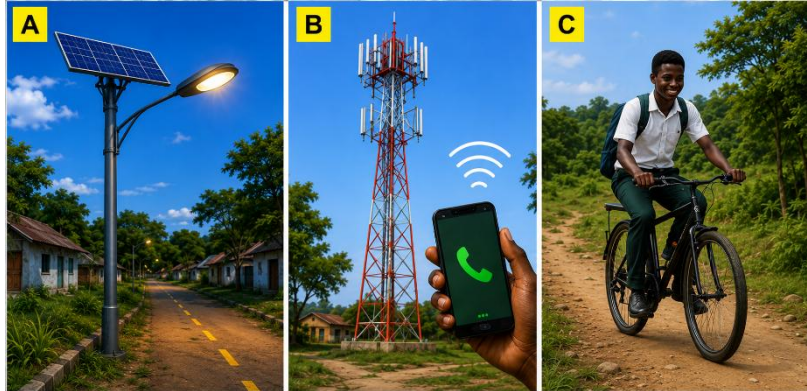
*A group of learners attended the 20th African Ministerial Conference on the Environment (AMCEN-20) in Nairobi. In one of the sessions, a presenter explained that the ozone layer and climate change are linked but are caused by different environmental processes.*

9. Participating countries were encouraged to implement measures to reduce climate change. Which of the following actions, if implemented, would have the **greatest** direct impact on reducing greenhouse gas emissions?
- A. Expand programmes that reduce electricity consumption.
  - B. Invest in solar, wind and other clean energy technologies.
  - C. Increase tree-planting campaigns in urban and rural areas.
  - D. Improve public awareness of sustainable environmental practices.
10. After the conference, the learners researched and wrote about how changes in the ozone layer can affect climate. Which of the following statements **best** explains what they found out? Changes in ozone levels can change how
- A. much oxygen is produced by green plants.
  - B. much carbon dioxide is produced
  - C. the atmosphere absorbs heat.
  - D. much water is stored in the atmosphere.

**SECTION B (65 Marks)**

Answer **all** the questions in the spaces provided

11. Grade 10 learners were asked to bring picture cuts showing various ways in which science and technology is used to make everyday life better. The following figure shows some of the picture cuts they presented.



- a) Identify the **main** branch of Physics illustrated by each of the technologies in the paper cut labelled A, B, and C. (3 marks)

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- b) During a class discussion, a learner makes the following claim:

*"Modern life would continue the same way, even if knowledge of Physics did not exist."*

Your friend, Kennedy, agrees with this claim. Other than what is demonstrated in the figure, use **two** other examples to explain to Kennedy why the claim is **incorrect**. (4 marks)

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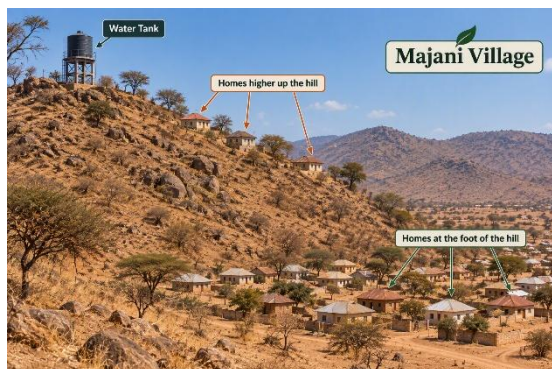
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12. The figure shows Majani Village, where a large water tank has been built at the top of a hill to supply water to



nearby homes. A few weeks later, residents noticed a strange pattern. At the foot of the hill, water rushed through the pipes so strongly that the pipes frequently burst. Higher up the hill, however, residents complained that water flowed so slowly that they could hardly fill a bucket

(a) Explain

- (i) why residents living at the foot of the hill experience frequent pipe bursts. (2 marks)

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- (ii) Why the residents living higher up the hill complained that water flowed so slowly that they could hardly fill a bucket. (2 marks)

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- (b) Suggest **two** measures that you would recommend for implementation to ensure a reliable water supply for all residents, regardless of where they live. Give reasons to support your recommendations. (4 marks)

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- (c) During a prolonged dry season, the water level in the tank fell to half its original height. How would this affect the water supply to residents at the foot of the hill and those on higher ground? Explain your answer. (4 marks)

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a) Identify **two** mechanical properties that you would consider when choosing materials for the helmet. (2 marks)

**b)** How would each of the two mechanical properties identified in (a) help to protect the rider during an accident? (2 marks)

c) As a member of the design team, describe **one experiment** your team would conduct to determine whether the material chosen can effectively protect a rider during an accident. (6 marks)

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14. A group of Physics learners from Bidii Senior School were travelling from Nairobi to Mombasa for a field study. As the journey continued, the learners began to feel uncomfortable because the temperature inside the bus was rising. To find out how hot it had become, the bus *conductor* decided to measure the temperature inside the bus before taking any action.

(a) (i) Do you think feeling hot alone is sufficient to conclude that the temperature has increased? (1 mark)

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(ii) Justify the answer in (a) (i) (2 marks)

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(b) The bus *conductor* has two thermometers, the digital one and a liquid-in-glass thermometer.

(i) Which thermometer would you advise the conductor to use to determine the temperature on the bus? (1 mark)

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(ii) State **two** reasons to support your advice to the conductor. (2 marks)

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(c) One of the learners tells the conductor to place the thermometer on the dashboard, under direct sunlight, to get the temperature faster. Explain why this might not be good advice. (2 marks)

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15. During a practical lesson on *stability*, a group of Grade 10 learners were investigating the *centre of gravity* of

an irregular shaped cardboard. Two learners used the same

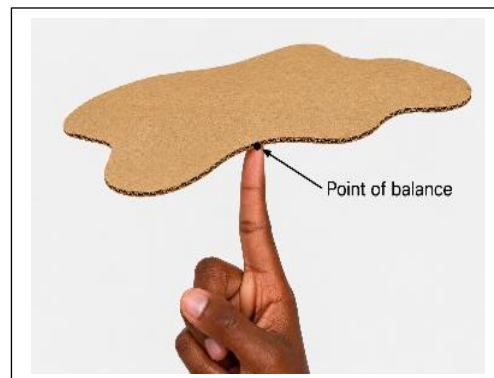
piece of cardboard and tried to balance it on their fingertips

as shown in the figure. However, they found that the cardboard balanced

at different positions. The two learners disagreed,

with each insisting that their position was the

correct centre of gravity.



- (a) Using a diagram, describe the **best** method that the two learners can use to accurately determine the centre of gravity of the object to resolve the disagreement. (5 marks)

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- (b) After the learners had finally agreed on the correct position of the centre of gravity, a small piece of the cardboard accidentally broke off from one side. Explain how this affected the position of the centre of gravity. (3 marks)

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16. Members of a certain community worked together to improve access to clean water. As part of the project, they used a wheel-and-axle machine to reduce the effort required to draw water from a borehole, as shown in the figure.



One member used the machine to draw water. He observed that when the bucket is full of water, it weighs 360 N and requires an effort of 150 N to lift.

- (a) Determine the mechanical advantage of the machine (3 marks)

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- (b) If the machine has a velocity ratio of 3, describe how the learners can verify this experimentally. (3 marks)

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- (c) If the minimum recommended efficiency for such machines is 70%, would you advise the community to continue using this machine? Use mathematical calculations to justify your answer. (4 marks)

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- (d) After several months of use, members observed that it takes more effort to draw the same amount of water, even though the wheel and axle were not changed. Explain **one** possible reason for this observation. (2 marks)

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17. During a school trip to a rocky valley, a learner stood near a large rock face and shouted. A few seconds later, the learner heard the sound coming back from the rock face. The learner wondered what caused the sound to return, yet no one else shouted back.

- (a) Explain why the learner heard the sound again. (2 marks)

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- (b) Pokosi, one of the learners, wants to investigate how the distance between him and the rock face affects the loudness of the repeated sound. Describe **one** experiment he can carry out to investigate this relationship. (4 marks)

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- (c) The learner observed that some surfaces in the valley produced a clearer repeated sound than others. Explain this observation. (2 marks)

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