



School Name

2022 FINAL EXAMINATION

Physics

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black pen
- Draw diagrams using pencil
- Calculators approved by NESA may be used
- A data sheet, formulae sheet and Periodic Table are provided at the back of this paper

Total marks:
4

Section I – 20 marks (pages 2–24)

- Attempt Questions 1–20
- Allow about 35 minutes for this section

Section II – 80 marks (pages 17–36)

- Attempt Questions 21–35
- Allow about 2 hours and 25 minutes for this section

Section I

20 marks

Attempt Questions 1–20

Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1–20.

- 1** A marble is rolled off a horizontal bench and falls to the floor.



Rolling the marble at a slower speed would

- A. increase the range.
 - B. decrease the range.
 - C. increase the time of flight.
 - D. decrease the time of flight.
- 2** A positively charged particle is moving at velocity, v , in an electric field as shown.



What is the direction of the force acting on the particle due to the electric field?

- A. Into the page
- B. Out of the page
- C. Up the page
- D. Down the page

- 3 Which of the following is NOT a fundamental particle in the Standard Model of matter?
- A. Electron
 - B. Gluon
 - C. Muon
 - D. Proton

- 4 An astronaut is travelling towards Earth in a spaceship at $0.8c$. At regular intervals, a radio pulse is sent from the spaceship to an observer on Earth.

Which quantity would the astronaut and the observer measure to be the same?

- A. Length of the spaceship
- B. Speed of the radio pulses
- C. Momentum of the astronaut
- D. Time interval between the radio pulses

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Physics

Section II Answer Booklet

80 marks

Attempt Questions 21–35

Allow about 2 hours and 25 minutes for this section

Instructions

- Write your Centre Number and Student Number at the top of this page.
 - Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
 - Show all relevant working in questions involving calculations.
 - Extra writing space is provided at the back of this booklet. If you use this space, clearly indicate which question you are answering.
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Please turn over

Question 5 (4 marks)

A DC motor is constructed from a single loop of wire with dimensions 0.10 m. The magnetic field strength is 0.40 T and a current of 14 A flows through the loop.



- (a) Calculate the magnitude of the maximum torque produced by the motor. **2**

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- (b) Describe how the magnitude of the torque changes as the loop moves through half a rotation from the position shown. **2**

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Question 5 continues on page 7

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Student Number

Question 5 (continued)

How do the results from

Question 6 (0 marks)

Another question

Section II extra writing space

If you use this space, clearly indicate which question you are answering.

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