LUI | | | | | | | | | | | School code | | | | |

School name

Given name/s

Family name

Attach your barcode ID label here

Book of books used

External assessment 2022

Question and response book

Physics

Paper 1

Time allowed

- Perusal time — 10 minutes
- Working time — 90 minutes

General instructions

- Answer all questions in this question and response book.
- QCAA-approved calculator permitted.
- QCAA formula and data book provided.
- Planning paper will not be marked.

Section 1 (20 marks)

- 20 multiple choice questions

Section 2 (28 marks)

- 8 short response questions

Clear zone — margin trimmed off after completion of assessment

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

DO NOT WRITE ON THIS PAGE

THIS PAGE WILL NOT BE MARKED

Section 1

Instructions

- Choose the best answer for Questions 1–20.
- This section has 20 questions and is worth 20 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

	A	B	C	D
Example:	●	○	○	○

	A	B	C	D
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○
11.	○	○	○	○
12.	○	○	○	○
13.	○	○	○	○
14.	○	○	○	○
15.	○	○	○	○
16.	○	○	○	○
17.	○	○	○	○
18.	○	○	○	○
19.	○	○	○	○
20.	○	○	○	○

Section 2

Instructions

- Write using black or blue pen.
- If you need more space for a response, use the additional pages at the back of this book.
  - On the additional pages, write the question number you are responding to.
  - Cancel any incorrect response by ruling a single diagonal line through your work.
  - Write the page number of your alternative/additional response, i.e. See page …
  - If you do not do this, your original response will be marked.
- This section has eight questions and is worth 28 marks.

DO NOT WRITE ON THIS PAGE

THIS PAGE WILL NOT BE MARKED

Do not write outside this box.

QUESTION 21 (2 marks)

A hot iron bar was observed to have a deep red colour. As the iron bar was heated further, the colour changed to orange.

Explain the observed colour change in terms of black-body radiation.

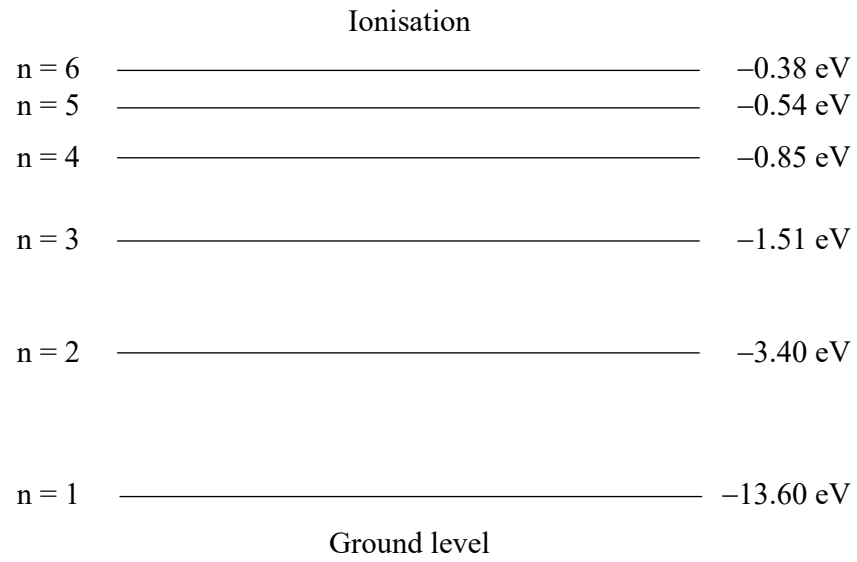
QUESTION 22 (2 marks)

A collection of mesons was observed by a detector to move an average distance of 11.0 m when travelling at 95% of the speed of light. However, based on their properties, the mesons were expected to travel an average distance of 3.4 m.

Explain the difference between the observed and expected average distances.

QUESTION 23 (6 marks)

The diagram shows the electron energy levels for hydrogen.

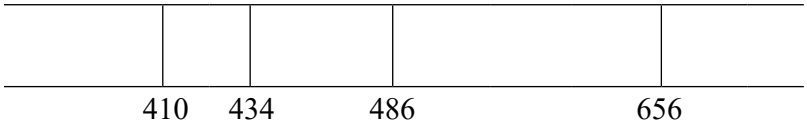


a) Calculate the energy released, in joules, when an electron moves from the third to the first energy level. Show your working. *[3 marks]*

Energy released = _____ J (to three significant figures)

Do not write outside this box.

The visible light emission spectrum for hydrogen is shown.



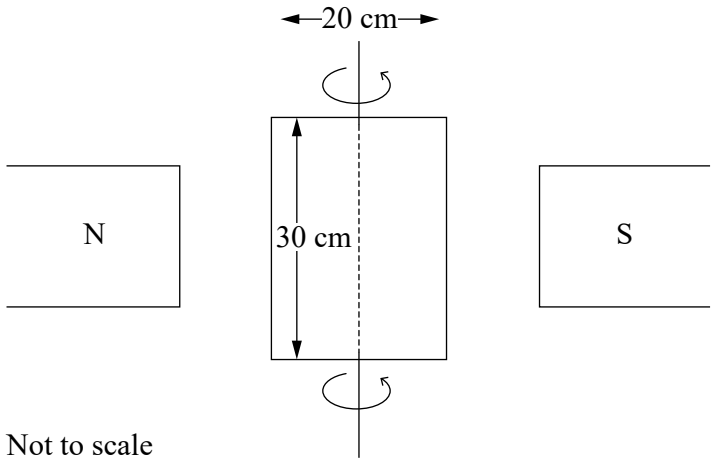
Wavelength (nm)

b) Explain why hydrogen only has four emission spectrum lines in the visible (i.e. 400–700 nm) spectrum. *[3 marks]*

Do not write outside this box.

QUESTION 24 (3 marks)

A rectangular loop is placed in a uniform magnetic field of 5 mT.



Not to scale

Calculate the change in flux through the loop when it is rotated 60° around the vertical axis. Show your working.

Change in flux = _____ Wb (to two significant figures)

Do not write outside this box.

QUESTION 25 (2 marks)

Describe how electromagnetic radiation is propagated by the interaction between electric and magnetic fields.

QUESTION 26 (1 mark)

Carbon-14 undergoes nuclear decay to nitrogen-14.

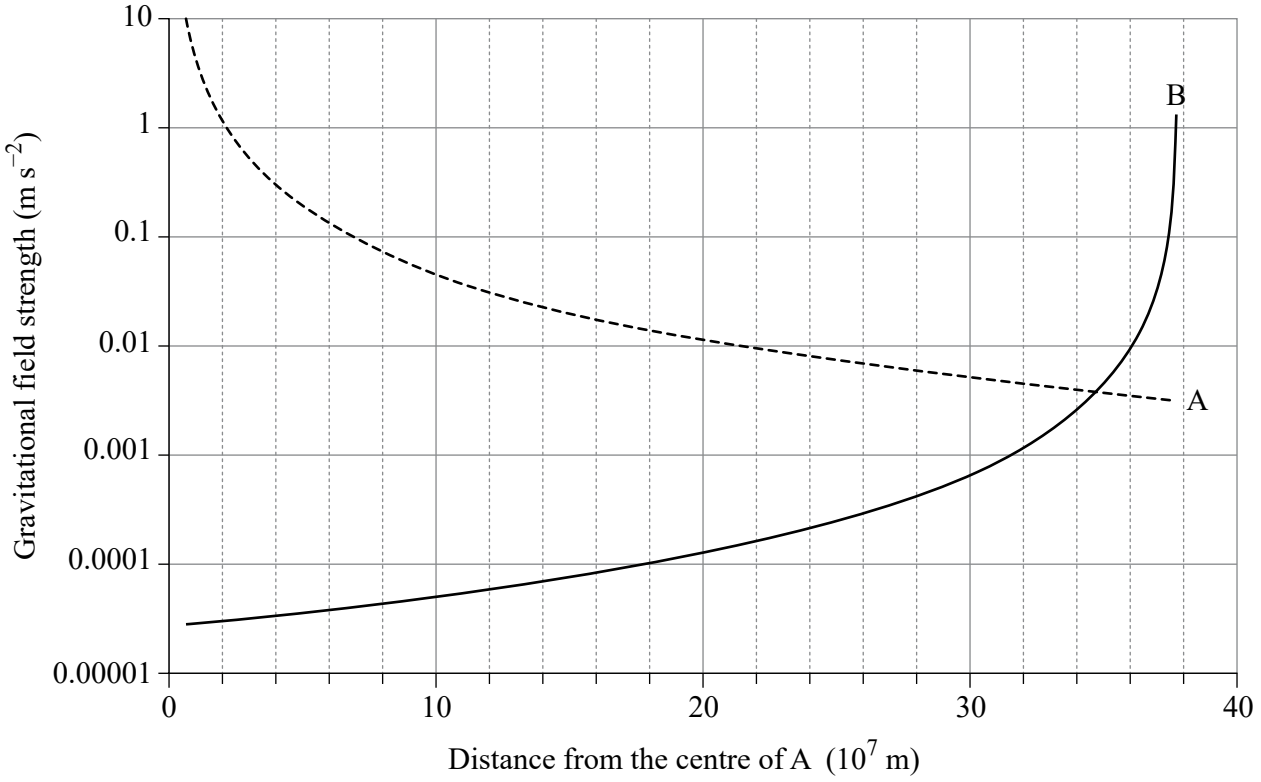
$$^{14}_{6}C \rightarrow {}^{14}_{7}N + e^{-} + \check{\nu}_e$$

List the two types of particles whose total number must be conserved in this reaction.

Do not write outside this box.

QUESTION 27 (5 marks)

Object A is five times the mass of object B. The graph shows the contribution of each object towards the strength of the net gravitational field between them.



Determine the total distance between the centre of the two objects. Show your working.

Do not write outside this box.

Total distance = _____ m (to two significant figures)

Do not write outside this box.

QUESTION 28 (7 marks)

An object of mass 200 g moves in a uniform circular path with a radius of 25 cm. The time taken for 10 revolutions is 3.0 s.

a) Calculate the distance travelled by the object after 3.9 s. Show your working. *[2 marks]*

Distance = _____ m (to two significant figures)

b) Calculate the centripetal force acting on the object. Show your working. *[5 marks]*

Centripetal force = _____ N (to two significant figures)

END OF PAPER

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.