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

School name

Given name/s

Family name

Attach your
barcode ID label here

Book of books used

External assessment 2021

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 (23 marks)

- 6 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 six questions and is worth 23 marks.

QUESTION 21 (3 marks)

Explain how transformers work in terms of Faraday's law and electromagnetic induction.

Do not write outside this box.

QUESTION 22 (3 marks)

A planet is orbiting a 3.38×10^{31} kg star. The radius of the orbit is 4.23×10^{8} km.

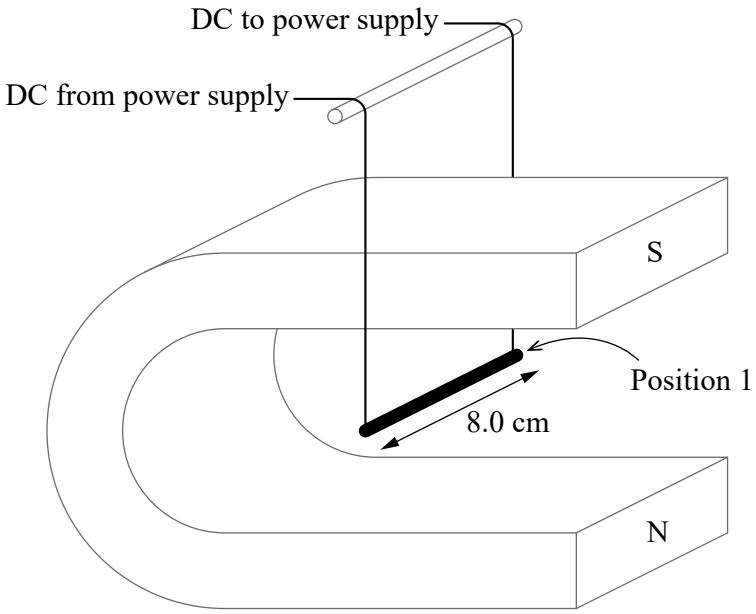
Calculate the average speed of the planet.

Average speed = _____ m s^{-1} (to the nearest whole number)

Do not write outside this box.

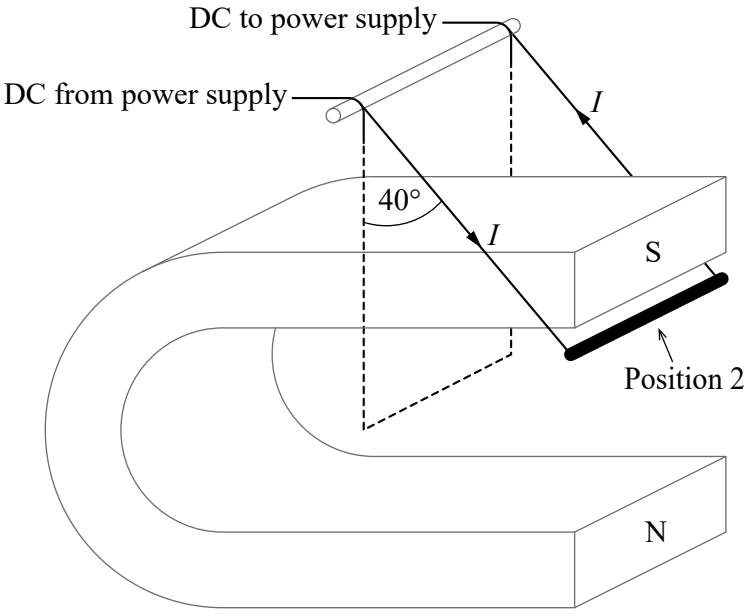
QUESTION 23 (5 marks)

The diagram shows a metal rod with a mass of 10.0 g and a length of 8.0 cm suspended in a uniform magnetic field of 0.50 T. There is no electric current through the metal rod when it is in Position 1.



Not to scale

When a current (I) is passed through the metal rod it moves to Position 2, with an angle of 40° to the vertical.



Not to scale

Do not write outside this box.

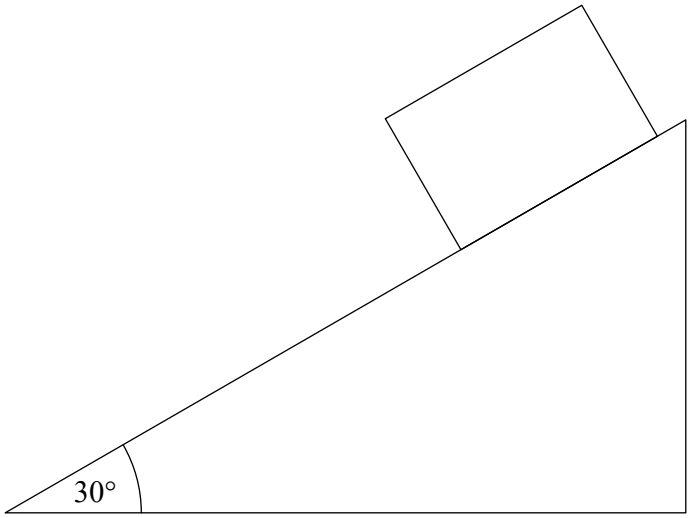
Determine the magnitude of the current required to move the metal rod into Position 2.

Current = _____ A (to 1 decimal place)

Do not write outside this box.

QUESTION 24 (3 marks)

The diagram shows a 1.5 kg object on an inclined plane with an angle of 30° up from the horizontal. The object experiences a frictional force of 4.5 N.



Not to scale

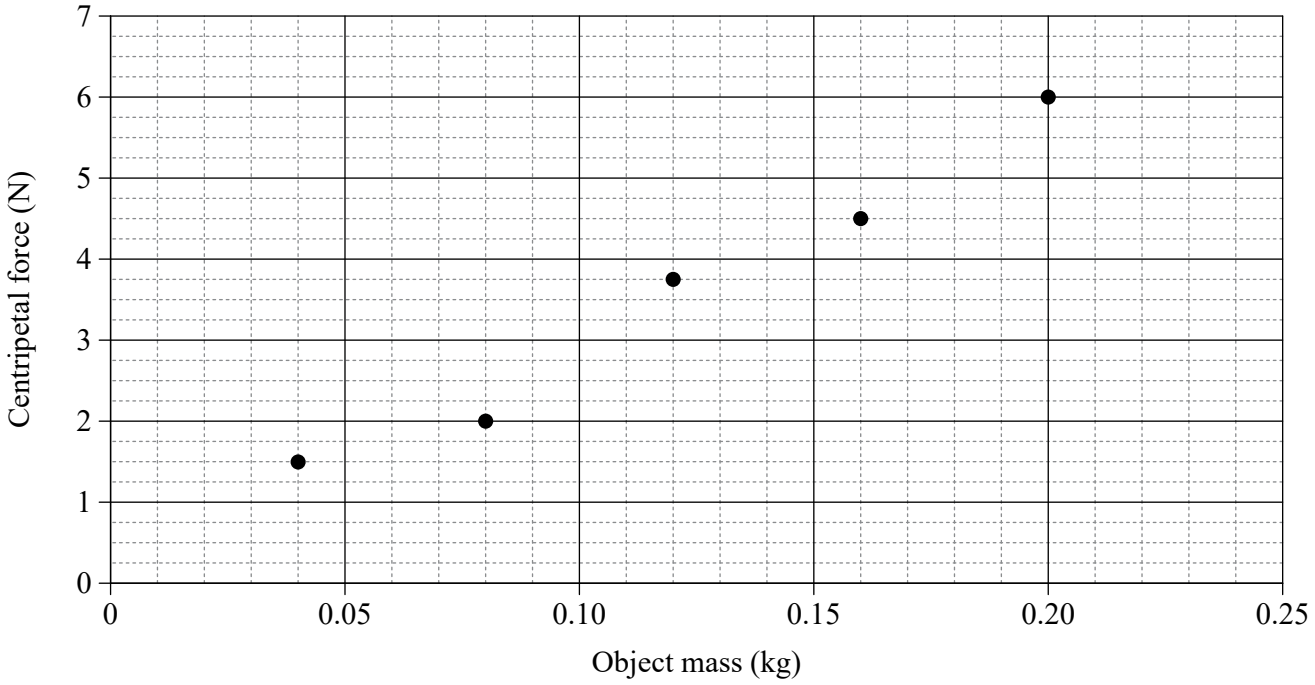
Calculate the magnitude of the net force acting on the object.

Magnitude of net force = _____ N (to 1 decimal place)

Do not write outside this box.

QUESTION 25 (4 marks)

The graph shows the centripetal forces required to keep objects with different mass in uniform circular motion with a constant speed and constant radius of 20 cm.



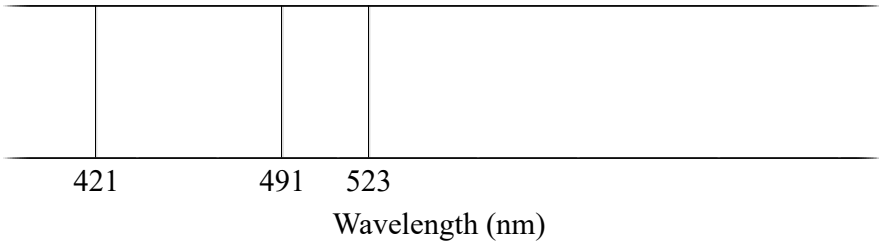
Determine the speed of the objects.

Speed = _____ m s^{-1} (to 1 decimal place)

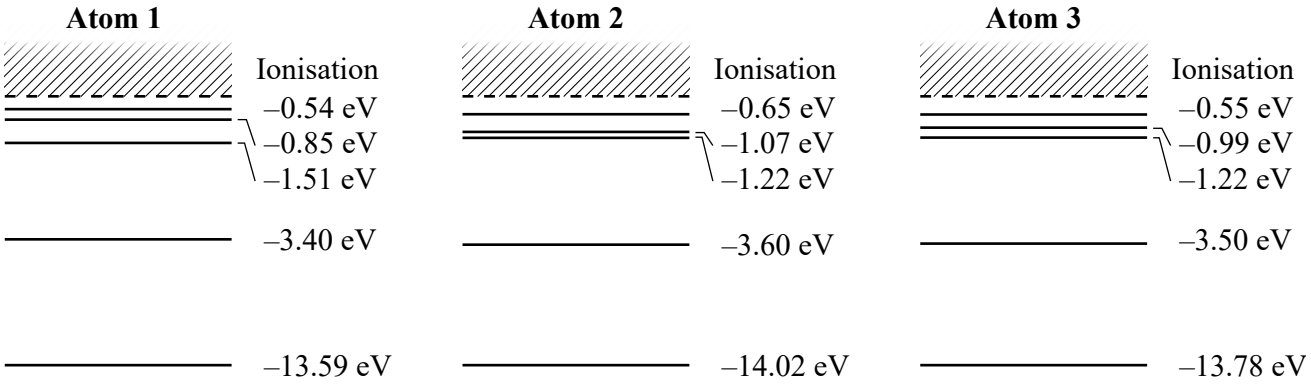
Do not write outside this box.

QUESTION 26 (5 marks)

A physicist has identified the absorption spectrum of an unknown atom.



The diagram shows the atomic energy levels for three atoms.



Not to scale

Determine which atom is most likely to be the unknown atom.

Do not write outside this box.

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.

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