

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
TOTAL	



General Certificate of Education  
Advanced Level Examination  
June 2010

## Physics A

## PHYA5/2B

### Unit 5B Medical Physics Section B

Tuesday 29 June 2010 1.30 pm to 3.15 pm

**For this paper you must have:**

- a calculator
- a ruler
- a Data and Formulae Booklet.

**Time allowed**

- The total time for both sections of this paper is 1 hour 45 minutes.  
You are advised to spend approximately 50 minutes on this section.

**Instructions**

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

- The marks for questions are shown in brackets.
- The maximum mark for this section is 35.
- You are expected to use a calculator where appropriate.
- A *Data and Formulae Booklet* is provided as a loose insert.
- You will be marked on your ability to:
  - use good English
  - organise information clearly
  - use specialist vocabulary where appropriate.

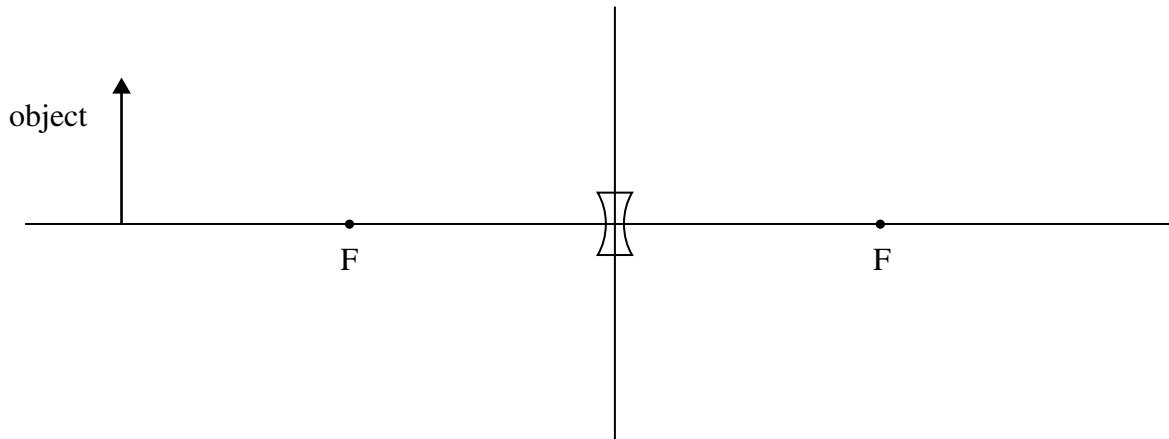


J U N 1 0 P H Y A 5 2 B 0 1

**Section B**

The maximum mark for this section is 35 marks. You are advised to spend approximately 50 minutes on this section.

- 1 (a)** Complete the ray diagram to show the formation of the image of a real object by a diverging lens.



*(2 marks)*

- 1 (b)** Define the power of a lens.

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*(1 mark)*



1 (c) A lens of focal length  $-0.56\text{ m}$  is used to correct a defect of vision of an eye.

1 (c) (i) Name this defect of vision.

.....  
(1 mark)

1 (c) (ii) The defective eye has an unaided near point at  $0.15\text{ m}$  from the eye.  
Calculate the aided near point distance, giving your answer to an appropriate number of significant figures.

answer = ..... m  
(3 marks)

1 (d) Another person was found to suffer from astigmatism. State the format of the prescription to correct this defect.

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(1 mark)

8
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Turn over for the next question

Turn over ►



**2 (a) (i)** Describe how the vibrations of a sound wave are received by the outer ear and transmitted to the inner ear.

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*(3 marks)*

**2 (a) (ii)** Explain how the pressure changes due to the sound wave are amplified by the ear.

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*(2 marks)*

**2 (b)** An intensity meter, set to the dB scale, measures the intensity level of a sound as 46 dB. Calculate the intensity of the sound at the meter, giving an appropriate unit.

answer = .....

*(3 marks)*



**2 (c)** The scale on the intensity meter is changed to the dBA scale and the new reading, for the same sound, is found to be 50 dBA. Explain this change.

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*(2 marks)*

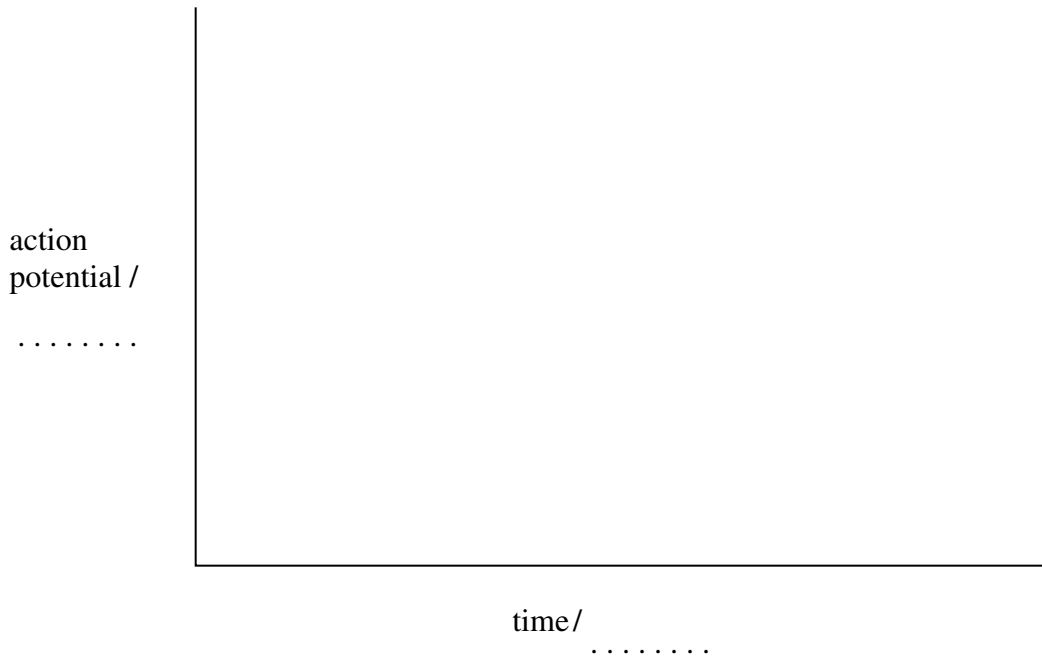
10

**Turn over for the next question**

**Turn over ►**



**3 (a)** On the axes below, sketch the action potential of a nerve cell. Indicate units and scales on both axes.



(3 marks)

**3 (b)** Explain in terms of ion movement, starting at resting potential, how bioelectrical signals are produced in muscle fibres.  
The quality of your written answer will be assessed in this question.

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(7 marks)

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**4 (a)** Outline the basic principles of a magnetic resonance (MR) scanner used to scan a patient's brain.

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*(3 marks)*

**4 (b)** State and explain **two** advantages of using an MR scanner to scan a patient's brain compared with a CT scanner.

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*(4 marks)*

**END OF QUESTIONS**

<b>7</b>



**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

