

71

Candidate Number

General Certificate of Secondary Education 2011–2012

## Science: Single Award (Modular)

Electricity, Waves and Communication

Module 5

Foundation Tier

[GSC51]

## MONDAY 14 NOVEMBER 2011

1.30 pm-2.15 pm

|  | LC     |
|--|--------|
|  | 75     |
|  | Ų      |
|  | C      |
|  | ζŕ     |
|  | $\sim$ |
|  |        |
|  |        |
|  |        |
|  |        |
|  |        |
|  |        |
|  |        |
|  |        |



45 minutes.

## **INSTRUCTIONS TO CANDIDATES**

Write your Centre Number and Candidate Number in the spaces provided at the top of this page. Write your answers in the spaces provided in this question paper . Answer **all six** questions.

## INFORMATION FOR CANDIDATES

The total mark for this paper is 45. Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.



| For Examiner's use only |       |  |  |  |
|-------------------------|-------|--|--|--|
| Question<br>Number      | Marks |  |  |  |
| 1                       |       |  |  |  |
| 2                       |       |  |  |  |
| 3                       |       |  |  |  |
| 4                       |       |  |  |  |
| 5                       |       |  |  |  |
| 6                       |       |  |  |  |
| Total<br>Marks          |       |  |  |  |

1 (a) Given below are the names of some electrical components and **Examiner Only** Marks Remark descriptions of what they do. Using lines, match each component with its correct description. Component Description Measures Ammeter voltage Measures Voltmeter current Changes electricity Battery to light Changes chemical Bulb energy to electricity [3] (b) Some pupils wanted to find the resistance of a bulb. Part of their circuit is shown below. (i) Complete the circuit by adding, in the correct places, the symbols for an ammeter and a voltmeter. [3]

| (ii) | When the expervision when the experimeter reading the second seco | iment was carried<br>g was 5 V and th | d out it was four<br>e ammeter reac | nd that the<br>ding was 2 A. |       | Examin<br>Marks | er Only<br>Remark |
|------|--|---------------------------------------|-------------------------------------|------------------------------|-------|-----------------|-------------------|
|      | Use the equatio  | n:                                    |                                     |                              |       |                 |                   |
|      |  | resistance =                          | voltage<br>current                  |                              |       |                 |                   |
|      | to calculate the   | resistance of the                     | bulb.                               |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  | Resist                                | ance =                              |                              | [2]   |                 |                   |
|      |  |                                       |                                     |                              | _ L_1 |                 |                   |
| (iii | ) Name the unit o  | f resistance.                         |                                     |                              |       |                 |                   |
|      | Choose from:   | ohm                                   | volt                                | ioulo                        |       |                 |                   |
|      | amp  | onin                                  | voit                                | jouie                        |       |                 |                   |
|      |  |                                       |                                     |                              | _ [1] |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       |                                     |                              |       |                 |                   |
|      |  |                                       | 3                                   |                              |       | LIUL            | n over            |

| 2 | Ene | rgy  | sources can be classified as rene        | ewable or non-re  | enewable.      | Exami | ner Only<br>Remark |
|---|-----|------|--|-------------------|----------------|-------|--------------------|
|   | (a) | (i)  | What is meant by the term 'rene          | wable'?           |                |       |                    |
|   |     |      | Choose from:                             |                   |                |       |                    |
|   |     |      | will run out : can be use                | ed again :        | will not rur   | out   |                    |
|   |     |      |  |                   |                | [1]   |                    |
|   |     | (ii) | Place the following energy source table. | ces in the correc | ct column of t | he    |                    |
|   |     |      | coal hydro                               | electric          | solar          |       |                    |
|   |     |      | wind nu                                  | uclear            | oil            |       |                    |
|   |     |      | Renewable                                | Non-renew         | able           |       |                    |
|   |     |      |  |                   |                |       |                    |
|   |     |      |  |                   |                |       |                    |
|   |     |      |  |                   |                |       |                    |
|   |     |      |  |                   |                |       |                    |
|   |     |      |  |                   |                | [3]   |                    |
|   |     |      |  |                   |                |       |                    |
|   |     |      |  |                   |                |       |                    |
|   |     |      |  |                   |                |       |                    |

| (b) | Choos<br>below. | e statements from the list to answer parts (i), (ii) and (iii) |     | Examin<br>Marks | er Only<br>Remark |
|-----|-----------------|--|-----|-----------------|-------------------|
|     |                 | Does not produce greenhouse gases                              |     |                 |                   |
|     |                 | River valleys are flooded                                      |     |                 |                   |
|     |                 | Produces nuclear waste   |     |                 |                   |
|     |                 | Noisy and ugly   |     |                 |                   |
|     |                 | Only works during the day                                      |     |                 |                   |
|     | <b>(i)</b> Gi   | ve an <b>advantage</b> of wind power.                          |     |                 |                   |
|     | _               |  | [1] |                 |                   |
|     | (iii) Gi        | ve a <b>disadvantage</b> of nuclear power                      |     |                 |                   |
|     | (,              |  | [1] |                 |                   |
|     |                 |  | [.] |                 |                   |
|     | <b>(iii)</b> Gi | ve a <b>disadvantage</b> of solar power.                       |     |                 |                   |
|     | _               |  | [1] |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |
|     |                 |  |     |                 |                   |

| The<br>loud | e pict<br>dspe | ure below shows akers.                  | a concert with sou                     | ind waves bei            | ng produced   | by    | Examiner Only<br>Marks Remar |
|-------------|----------------|---|--|--------------------------|---------------|-------|------------------------------|
|             |                | Picture of                              | rock band with lou                     | dspeakers                |               |       |                              |
| (a)         | (i)            | How do loudspea                         | akers produce sou                      | nd waves?                |               |       |                              |
|             |                | blow                                    | vibrate                                | flash                    | spin          |       |                              |
|             |                |   |  |                          |               | _ [1] |                              |
|             | (ii)           | Which feature of music gets loude       | a sound wave incl<br>er?               | reases as the            | volume of the | Э     |                              |
|             |                | Circle the correct                      | et answer.                             |                          |               |       |                              |
|             |                | wavelength                              | amplitude                              | freque                   | ncy           | [1]   |                              |
|             | (iii)          | Apart from loudn hearing.               | ess, name one oth                      | ner factor that          | may af fect o | ur    |                              |
|             |                |   |  |                          |               | _ [1] |                              |
| (b)         | Hur<br>sou     | nans can hear fro<br>nds that are too h | m 20 Hz to 20 kHz<br>igh for human hea | z. What is the<br>aring? | name given to | 0     |                              |
|             |                |   |  |                          |               | _ [1] |                              |
|             |                |   |  |                          |               |       |                              |
|             |                |   |  |                          |               |       |                              |
|             |                |   |  |                          |               |       |                              |

3

| (c) | Ref  | lected sounds can cause problems in the concert hall.    |       | Examin | er Only<br>Remark |
|-----|------|--|-------|--------|-------------------|
|     | (i)  | What do we call reflected sounds?                        |       |        | Komark            |
|     |      |  | _ [1] |        |                   |
|     |      |  |       |        |                   |
|     | (ii) | Explain fully what is done to minimise reflected sounds. |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  | [2]   |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |
|     |      |  |       |        |                   |

(a) The following information was sent to mobile phone users asking 4 Examiner Only them to take part in a medical study. Marks Remar COSMOS is an international study on mobile phone use and possible long term effects on health. In the UK the research will be carried out by a university that will follow the health of 100,000 mobile phone users for 20 to 30 years. (i) Suggest a long term effect on health caused by mobile phone use that the researchers might be interested in. \_\_\_\_\_ [1] (ii) State two features about the study that will give reliable results. 1. \_\_\_\_\_[1] 2. [1] (b) Mobile phones work by sending signals to and from phone masts which boost the signal before passing it on. а © CCEA GCSE Single Award in Science Foundation Tier by A McFarland, C Murphy & J Napier, published by Hodder Education, 2009. ISBN 9780340974728 (i) Name the type of electromagnetic wave that carries these signals. [1] (ii) What is the name given to the area around a phone mast?

\_\_\_\_\_ [1]



5 An investigation was carried out using a bicycle dynamo to find how the amount of current produced depends on the speed of rotation of a magnet.



The investigation results are given below.

| Magnet speed/r.p.m. | Current produced/mA |
|---------------------|---------------------|
|                     | 0                   |
| 20                  | 2.2                 |
| 30                  | 3.4                 |
| 40                  | 4.4                 |
| 50                  | 5                   |
| 60                  | 5                   |
| 70                  | 5                   |

(a) Plot the points and draw a line graph on the grid below .



**Examiner Only** Marks Remark 0

[3]

| (b) | (i)        | State fully the conclusion that can be drawn from these results.   |     | Examiner Only |
|-----|------------|--|-----|---------------|
|     |            |  |     | Marks Reman   |
|     |            |  | [0] |               |
|     |            |  | [2] |               |
|     | (ii)       | Suggest the effect on the amount of current produced if:   |     |               |
|     |            | • a weaker magnet is used.   |     |               |
|     |            |  | [1] |               |
|     |            |  | ']  |               |
|     |            | <ul> <li>more coils of wire are used.</li> </ul>   |     |               |
|     |            |  | [1] |               |
| (c) | For<br>sim | ty years ago bicycles were fitted with dynamo powered lights ilar to the one used in this investigation. |     |               |
|     | Sug<br>pow | gest and explain why battery powered lights replaced dynamo vered lights.                                |     |               |
|     | •          | 5  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  | [2] |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |
|     |            |  |     |               |

6 The graph below shows how the level of ultraviolet (UV) radiation changed during typical summer and winter days. Skin needs protection above 3 units of UV.



(a) Use the information to suggest why sunscreen (sun protection) sales are greater in summer.

[1]

Examiner Only

Marks Remark

| (b) | UV<br>elec | radiation is just one part of the electromagnetic spectrum and a<br>ctromagnetic waves are transverse waves. | II    | Examine<br>Marks | r Only<br>Remark |
|-----|------------|--|-------|------------------|------------------|
|     | (i)        | Describe fully the movement of the particles in a transverse wave.   |       |                  |                  |
|     |            |  | <br>  |                  |                  |
|     | (ii)       | Apart from being transverse waves state <b>two</b> features that all electromagnetic waves have in common.   | . [2] |                  |                  |
|     |            |  |       |                  |                  |
|     | (iii)      | Apart from transverse waves name another type of wave.   | [1]   |                  |                  |
|     |            |  |       |                  |                  |
|     |            |  |       |                  |                  |
| -   | гні        | S IS THE END OF THE QUESTION PAPER   |       |                  |                  |
|     |            |  |       |                  |                  |
|     |            |  |       |                  |                  |
|     |            |  |       |                  |                  |

Permission to reproduce all copyright material has been applied for . In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.