

**Monday 28 January 2013 – Morning**

**GCSE DESIGN AND TECHNOLOGY**  
**Electronics and Control Systems**

**A512/01** Sustainable Design

Candidates answer on the Question Paper.

**OCR supplied materials:**  
None

**Other materials required:**  
None

**Duration:** 1 hour



Candidate forename		Candidate surname	
--------------------	--	-------------------	--

Centre number						Candidate number				
---------------	--	--	--	--	--	------------------	--	--	--	--

**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions in Section A **and** Section B.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- The quality of your written communication will be taken into account in marking your answer to the question marked with an asterisk (\*).
- This document consists of **12** pages. Any blank pages are indicated.

**SECTION A**

Answer **all** questions.

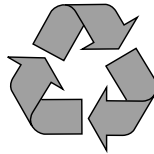
You are advised to spend 15 minutes on this section.

On questions 1–5 **circle** your answer.

- 1** Cardboard packaging from electronic products:
- (a) Can damage the ozone layer
  - (b) Helps absorb greenhouse gases
  - (c) Can be produced sustainably
  - (d) Will not biodegrade [1]
- 2** Carbon nanotubes are:
- (a) Small oil pipelines
  - (b) Caused by global warming
  - (c) Cheap to produce
  - (d) Ideal for producing rigid composites [1]
- 3** Electronic products should be soldered with lead-free solder because:
- (a) Lead is too heavy to lift
  - (b) Lead is harmful to humans
  - (c) Electricity does not flow through lead
  - (d) Lead is too expensive for everyday electronics [1]
- 4** When an aerosol can is empty, you should:
- (a) Compost it
  - (b) Refill it yourself
  - (c) Campaign to reduce harm to the ozone layer
  - (d) Recycle it [1]

- 5 Overheating electronic circuits:
- (a) Can cause a fire
  - (b) Emit carbon dioxide
  - (c) Improve home insulation
  - (d) Make your electricity meter run backwards [1]

6 State the meaning of the symbol shown:



..... [1]

7 Name **one** source of energy that contributes to global warming.  
 ..... [1]

8 What is meant by the term product analysis?  
 ..... [1]

9 Which of the 6Rs means consumers should use less of a product?  
 ..... [1]

10 Complete the sentence below  
 The E..... T..... Initiative works to improve the working lives of people. [1]

Decide whether each of the following statements is **true** or **false**.

Tick [✓] the box to show your answer.

	<b>True</b>	<b>False</b>	
11 Thermoplastics can be incinerated to recover energy	<input type="checkbox"/>	<input type="checkbox"/>	[1]
12 Wind energy is a non-renewable resource	<input type="checkbox"/>	<input type="checkbox"/>	[1]
13 Leaving electronic products on standby wastes energy	<input type="checkbox"/>	<input type="checkbox"/>	[1]
14 Built-in obsolescence makes products last longer	<input type="checkbox"/>	<input type="checkbox"/>	[1]
15 Product globalisation means products are available worldwide	<input type="checkbox"/>	<input type="checkbox"/>	[1]

**Total [15]**  
**Turn over**

**SECTION B**

Answer **all** questions.

You are advised to spend 45 minutes on this section.

**16** Fig. 1 shows an electronic speed display unit on a public road.



**Fig. 1**

**(a) (i)** Suggest **two** environmentally friendly methods of powering the display unit.

1 .....

.....

2 .....

.....

**[2]**

**(ii)** Environmentally friendly methods of powering the unit may not be 100% reliable. Suggest **two** ways of making sure power is always available for the unit.

1 .....

.....

2 .....

.....

**[2]**

(b) Fig. 2 shows a traffic information board that uses LEDs (light emitting diodes) as its light source.



Fig. 2

Give **four** environmental benefits of using LED lighting in a traffic information board.

- 1 .....
- 2 .....
- 3 .....
- 4 .....

[4]

(c) Self-cleaning glass is used in the traffic information board. State **one** way self-cleaning glass can benefit the environment.

- .....
- .....
- ..... [1]



17 Fig. 3 shows an electronic stopwatch.



Fig. 3

(a) List **four** specification points a designer should consider when designing a handheld electronic stopwatch.

- 1 .....
- 2 .....
- 3 .....
- 4 .....

[4]

(b) Describe **two** modifications that could be made to the design of the handheld electronic stopwatch shown in Fig. 3 that make it suitable for an elderly person.

- 1 .....
- .....
- .....
- 2 .....
- .....
- .....

[2]

(c) The electronic stopwatch uses a Lithium coin cell that is not rechargeable.

Give **three** disadvantages of using a cell that is not rechargeable.

- 1 .....
- 2 .....
- 3 .....

[3]

(d) To replace the cell in an electronic stopwatch a tool is needed to remove the cover.

Give **two** disadvantages to the consumer of having to use a tool to replace a cell.

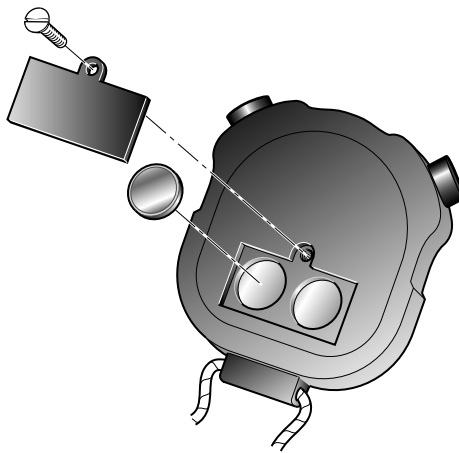
1 .....

.....

2 .....

..... [2]

(e) Using sketches and notes, suggest **one** modification to the battery compartment shown below that would make it easier to replace the cell.



[4]

**Total [15]**



18 Fig. 4 shows an energy monitor.

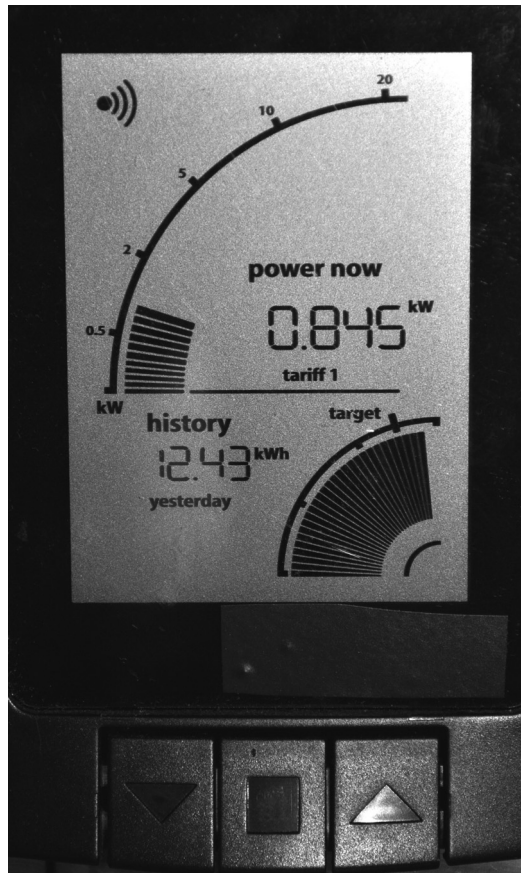


Fig. 4

(a) Explain **two** ways the energy monitor could help a household reduce their carbon footprint.

1 .....

.....

.....

.....

2 .....

.....

.....

[4]

(b) Name **two** fossil fuels that can be used to generate electricity.

1 .....

2 .....

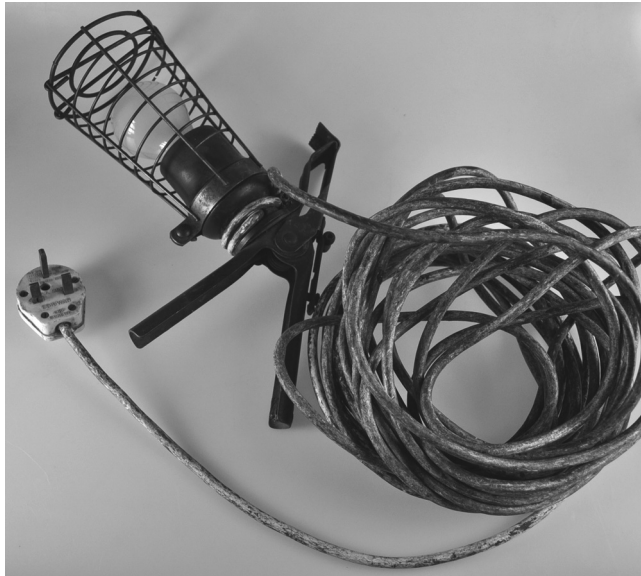
[2]

(c) State **three** situations that could cause an electric shock.

- 1 .....
- 2 .....
- 3 .....

[3]

(d) Fig. 5 shows a mains-powered inspection lamp and a rechargeable LED inspection lamp.



Mains powered inspection lamp



Rechargeable LED Lamp

Fig. 5

Explain **three** advantages to the user of the rechargeable LED inspection lamp compared with the mains powered inspection lamp.

- 1 .....
- .....
- .....
- .....
- 2 .....
- .....
- .....
- .....
- 3 .....
- .....
- .....
- .....

[6]

Total [15]

END OF QUESTION PAPER

11  
BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

**PLEASE DO NOT WRITE ON THIS PAGE**



**Copyright Information**

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website ([www.ocr.org.uk](http://www.ocr.org.uk)) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.