

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCE

Design and Technology

**Product Design: Resistant Materials Technology
Advanced**

Unit 3: Designing for the Future

Friday 25 June 2010 – Morning

Time: 2 hours

Paper Reference

6RM03/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches it must be dark (HB or B). Coloured pens, pencils and highlighter pens must not be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 70.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
– *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL the questions. Write your answers in the spaces provided.

1 Robots are increasingly being used in manufacturing.

(a) Name **two** manufacturing processes carried out by robots.

(2)

1

2

(b) Explain **three** benefits to the manufacturer of using robots for production.

(6)

1

2

3



(c) Robots are usually designed to operate using closed loop control systems to increase their reliability.

In the following box, draw a flow chart that illustrates a closed loop control system.

(2)



(Total for Question 1 = 10 marks)



2 Ergonomics are an important aspect of product design.

(a) Explain what is meant by the term 'ergonomics'.

(2)

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Figure 1 shows a plastic jug kettle and its base unit.

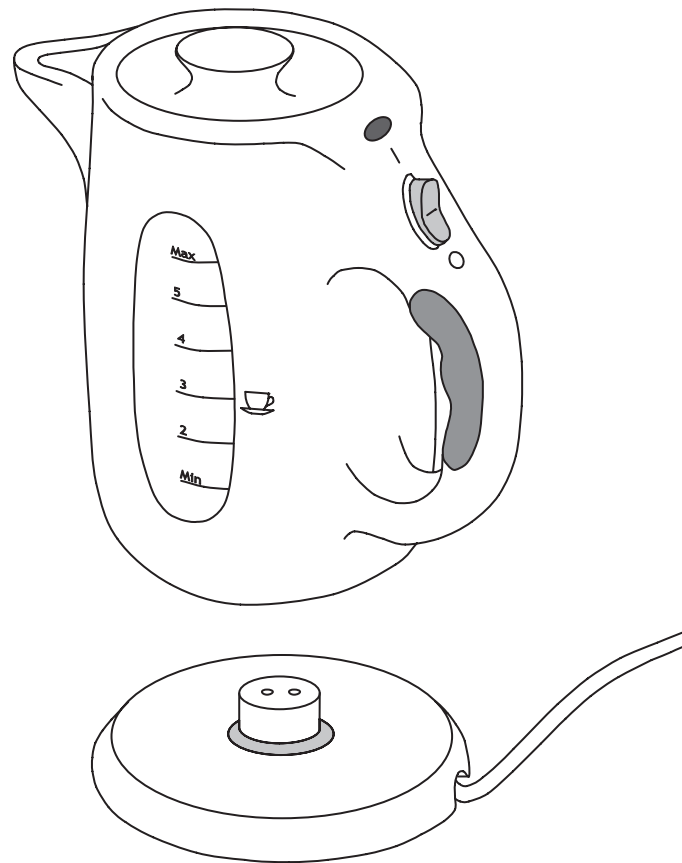


Figure 1



(b) Identify and explain **four** ergonomic features of the kettle shown in Figure 1.

(8)

1

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(Total for Question 2 = 10 marks)



3 (a) Automatic Guided Vehicles (AGVs) are often used to support manufacturing systems.

(i) Outline the task of AGVs within a manufacturing system.

(1)

(ii) State **three** different methods by which AGVs are guided around factory floors.

(3)

1

2

3



(b) Automated Storage and Retrieval Systems (ASRS) are used in manufacturing.

Give **two** advantages and **two** disadvantages of using ASRS instead of manual systems.

(4)

Advantages

1

2

Disadvantages

1

2

(Total for Question 3 = 8 marks)



***4** (a) Give **four** reasons why it is favourable to the environment to use recyclable materials.

(4)

1

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Smart materials are increasingly being used in products.

(b) Explain **three** benefits of smart materials.

(6)

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(Total for Question 4 = 10 marks)



5 (a) In 1997 the growing concern about global warming led the United Nations Framework Convention on Climate Change (UNFCCC) to agree the Kyoto Protocol.

(i) State the main aim of the Kyoto Protocol.

(1)

(ii) Developing countries are exempt from the requirements of the Kyoto Protocol.

Give **two** reasons for these exemptions.

(2)

1

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(iii) Give **three** reasons why the Kyoto Protocol was agreed in 1997 but did not come into force until 2005.

(3)

1

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(b) Nuclear energy is being considered as a possible major contributor to our future energy needs.

Evaluate the use of nuclear energy for our future energy needs.

(4)

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(Total for Question 5 = 10 marks)



6 (a) Explain the benefits to a business of using electronic methods of market analysis.

(6)

A series of horizontal dotted lines provided for writing the answer to the question.



***7** (a) Explain **two** ways in which a business could reduce the energy usage of its manufacturing systems.

(4)

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(b) Discuss, from the manufacturers' perspective, the issue of 'repair versus replacement' with regard to consumer goods.

(6)

Dotted lines for writing the answer.

(Total for Question 7 = 10 marks)

TOTAL FOR PAPER: 70 MARKS



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