

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4141/01

DESIGN & TECHNOLOGY

UNIT 1

FOCUS AREA: Product Design

P.M. FRIDAY, 23 May 2014

2 hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
Section A	1.	15
	2.	10
	3.	10
	4.	25
Section B	5.	10
	6.	15
	7.	20
	8.	15
Total	120	

ADDITIONAL MATERIALS

You will need basic drawing equipment, coloured pencils and a calculator for this examination.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. Where the space is not sufficient for your answer, continue at the back of the book, taking care to number the continuation correctly.

You are reminded of the necessity for good English and orderly presentation in your answers.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

Section A

Marked out of 60 60 minutes

1. This question is about Product Analysis. It is worth a total of 15 marks.

Study the pictures of a children’s camera and the Product Information shown below.



Product Information:

- large rubber grips on side handles;
- colour LCD display;
- 256MB built in memory (stores up to 500 photos);
- 5 built in games to play on the camera or via television;
- 2 viewfinders;
- available in 2 colours, blue and pink.

(a) A design specification was produced before designing the digital camera. Write a detailed specification point for **each** of the following headings.

(i) Safety [2]

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(ii) Function [2]

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(iii) Aesthetics [2]

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- (b) (i) When designing the camera, anthropometric data would have been considered. Describe what is meant by the term 'anthropometric data'. [2]

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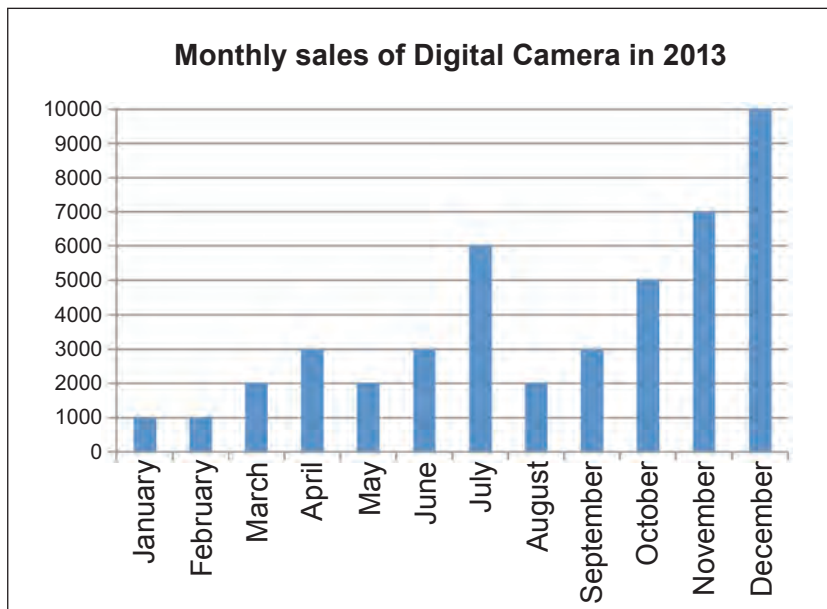
- (ii) Explain how ergonomics has affected the position of the buttons. [3]

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- (c) The graph shows monthly sales figures for the digital camera in 2013.



- (i) State which month had exactly 6000 sales. [1]
- (ii) Calculate what percentage of the annual sales were made during the month of December, to **two** decimal places. [3]
(Show all your workings).

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2. This question is about the general issues of Design and Technology. It is worth a total of 10 marks.

(a) (i) From the list below, select the correct name for **each** of the logos shown.

- Conformité Européenne Symbol
- British Standards Kitemark
- International Organisation for Standardisation (ISO)

Logo A



..... [1]

Logo B



..... [1]

(ii) Explain the meaning of **Logo A**. [2]

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(b) Complete the 6 Rs table below by adding the missing description and R.

<i>R</i>	<i>Description</i>
Recycle	(i) [2]
Repair	When a product breaks down or no longer works, try to fix it.
(ii) [1]	Minimise the amount of energy and materials that are used to make a product.

- (c) Shown below is an image of a mobile phone sound amplification device. The sound amplification device does not use any form of power but instead uses a shaped silicone horn to amplify the sound from the phone.



Discuss who are the winners and losers with respect to this product and explain why. [3]

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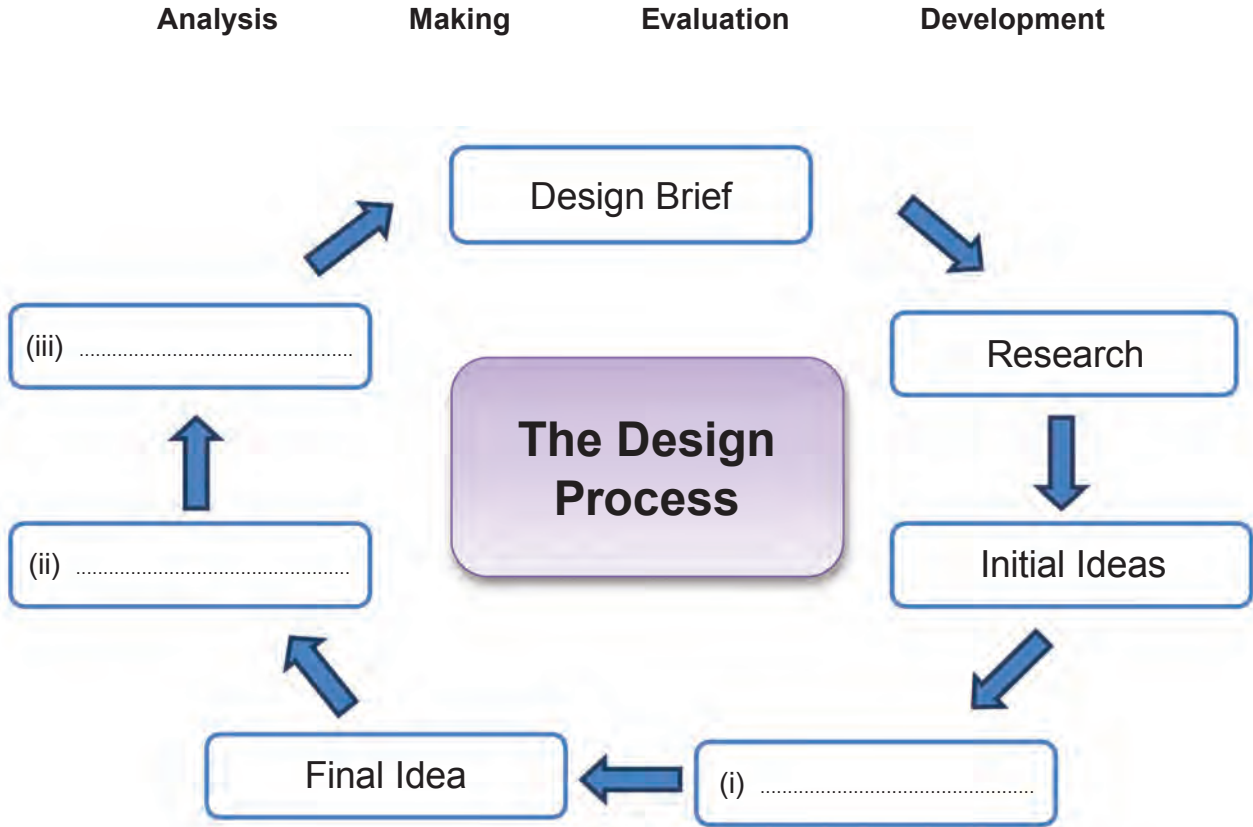
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4. This question is about the Design Process and how it is used. It is worth a total of 25 marks.

(a) Complete the diagram below by selecting the correct activities from the stages provided and placing them in the correct order, to show the stages of the design process. 3 × [1]



(b) (i) Explain the purpose of the design specification. [2]

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(ii) Describe how the disassembly of an existing product can be helpful to a designer before designing and making a new product. [2]

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- (c) Many people are now using their smartphones to play computer games. However, smartphones can become uncomfortable to hold while playing for a prolonged period of time and the controls can be awkward to operate.

You have been asked to design a hand-held accessory that a smartphone can be attached to while playing computer games in order to make it a more comfortable experience.



Specification

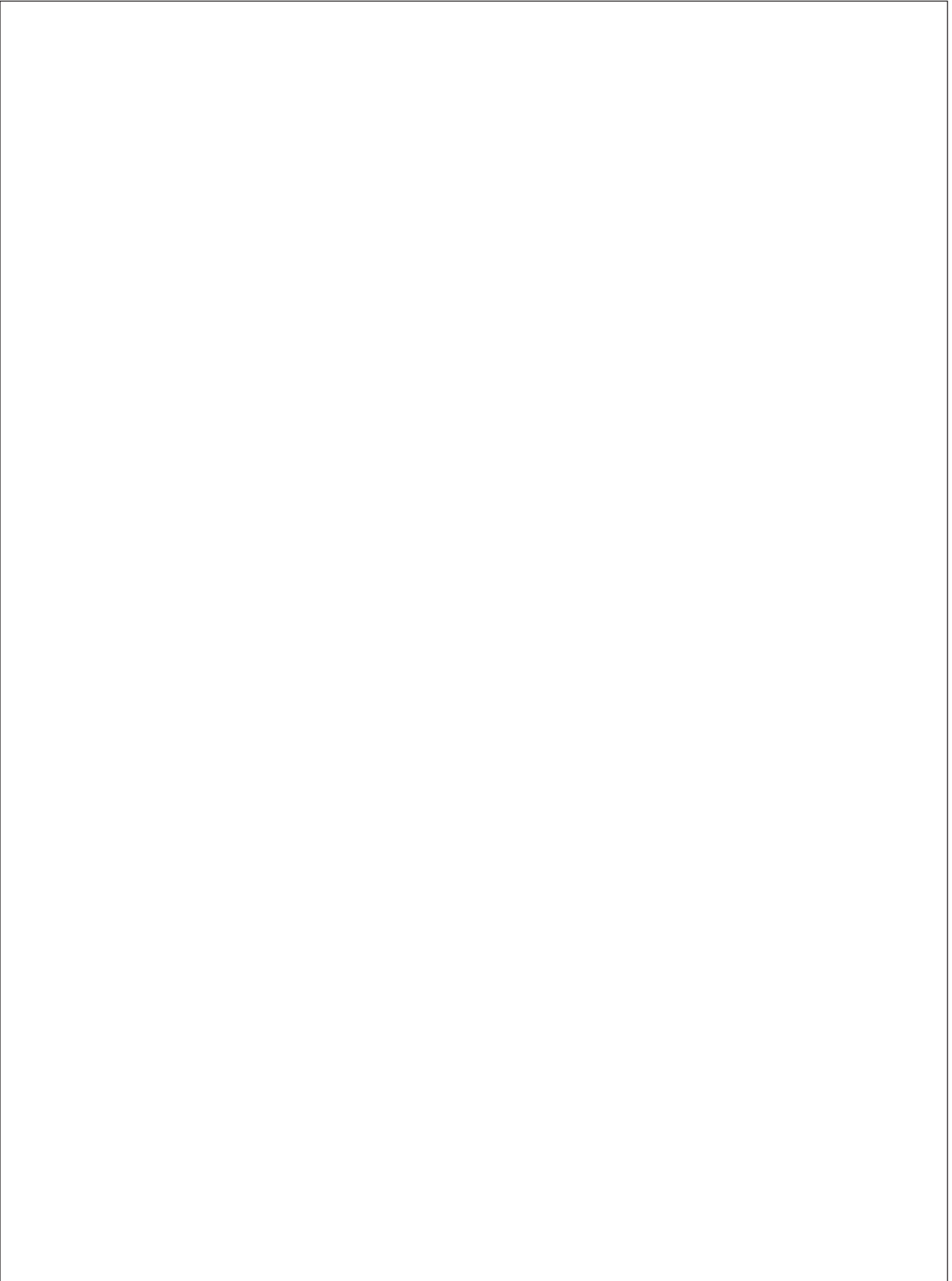
The design must:

- appeal to the teenage market;
- be **one** portable hand-held unit;
- show how the smartphone will be attached to the hand-held accessory;
- be ergonomically designed and easy to use.

Marks will be awarded for:

- | | |
|--|-----|
| (i) designing a portable hand-held accessory that appeals to the teenage market; | [4] |
| (ii) showing how the smartphone connects to the hand-held accessory; | [2] |
| (iii) showing three ergonomic design features; | [3] |
| (iv) specifying a suitable material and manufacturing process; | [2] |
| (v) showing three overall dimensions for the hand-held accessory; | [3] |
| (vi) quality of communication. | [4] |

Draw your design in the box below.



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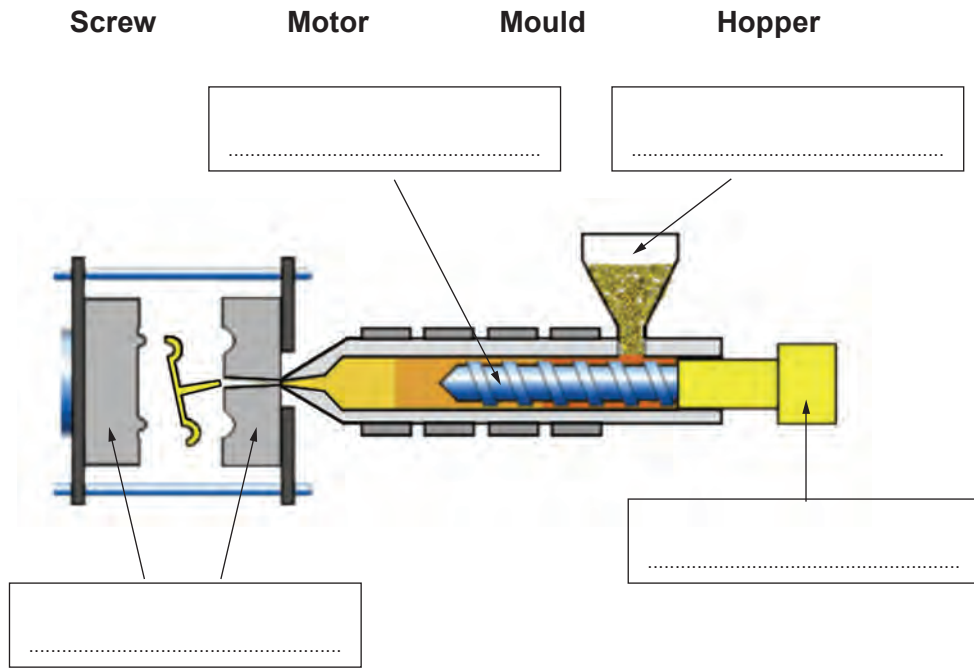
Section B

Marked out of 60 60 minutes

5. This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

(a) The diagram below shows an injection moulding machine.

(i) Using the words provided, select the correct name for **each** part of the injection moulding machine and place them in the boxes provided. 4 × [1]



(ii) Explain the advantages of using injection moulding for the production of products. [2]

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(b) Explain why quality control is important when mass producing products. [2]

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(c) Explain the importance of setting tolerances when products are produced in large quantities. [2]

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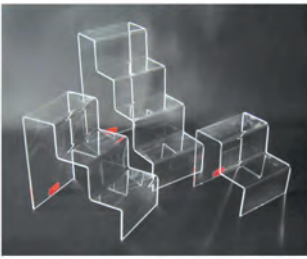
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6. This question is about Materials and Components. It is worth a total of 15 marks.

- (a) For **each** of the products shown in the table below **underline** the correct material and the correct classification for the material you have chosen. 4 × [1]
An example has been done for you.

<i>Product</i>	<i>Material</i>	<i>Classification</i>
 Water Bottle	HIPs <u>PET</u> HDPE	<u>Thermoplastic</u> Thermosetting Plastic
 Torch	Cast Iron Copper Aluminium	Ferrous Metal Non-Ferrous Metal
 Display stands	Acrylic Epoxy Resin Melamine Formaldehyde	Thermoplastic Thermosetting Plastic

- (b) Explain why acrylic is a suitable material for the external signage of a shop. [3]

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- (c) (i) The spoon pictured below has been modified using a smart material. Name the smart material that has been used. [1]



Name:

- (ii) Explain the properties of the above named smart material that make it suitable when developing the shape of the spoon handle. [3]

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- (d) Describe **one** advantage and **one** disadvantage to the designer, when using blue modelling foam to create a block model prototype such as the computer mouse model pictured below. [4]



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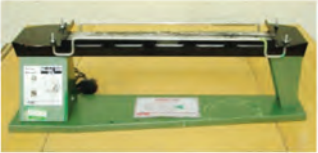

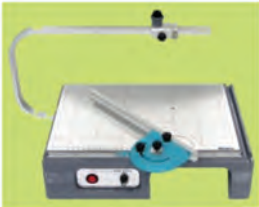
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7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) Complete the table by inserting the correct name for **each** piece of equipment and describe its use.

Machine/Equipment	Use
<p>A</p>  <p>Name: [1]</p>	<p>.....</p> <p>.....</p> <p>..... [2]</p>
<p>B</p>  <p>Name: [1]</p>	<p>.....</p> <p>.....</p> <p>..... [2]</p>
<p>C</p>  <p>Name: Hot Wire Cutter</p>	<p>.....</p> <p>.....</p> <p>..... [2]</p>

(b) State **three** safety precautions you should observe when using machine **B** pictured above. 3 × [1]

Precaution 1:

Precaution 2:

Precaution 3:

- (c) The image below shows an acrylic bottle rack. Use **notes** and **sketches** to describe in detail the main stages for manufacturing the bottle rack. *The first stage has been done for you.* [6]



Stage 1: Create male and female moulds out of a ridged, heat proof material.

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(d) Explain how testing a prototype before production can impact on the eventual success of a product. [3]

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Turn over for Question 8

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) (i) State the meaning of CAD. [2]

Computer A D

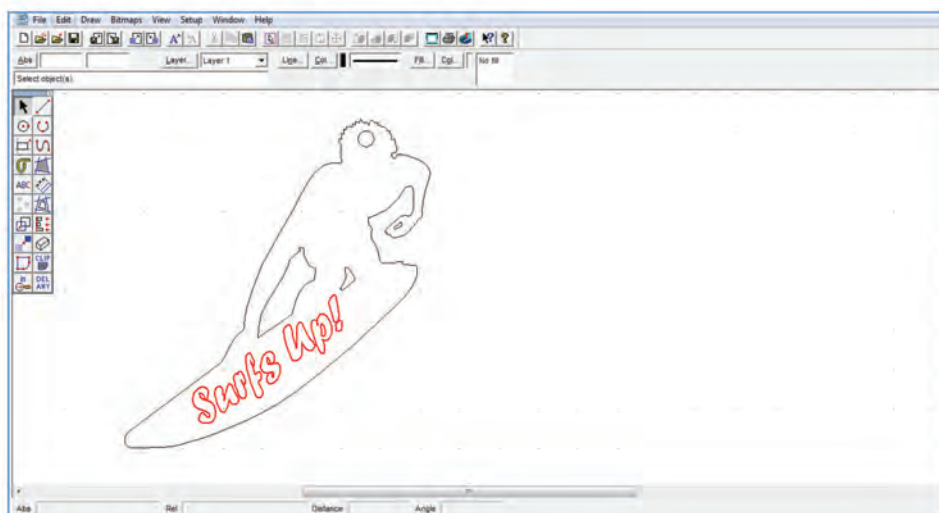
(ii) Name **one** CAD software package that you have used in Product Design. [1]

(iii) Describe **two** disadvantages of using CAM when developing a prototype.

Disadvantage 1: [2]

Disadvantage 2: [2]

(b) The CAD key ring pictured below has been designed to be manufactured using a laser cutter.



(i) Explain why **two** different coloured lines have been used in the design. [2]

(ii) Describe the process of setting up a laser cutter to cut the design from a 3 mm acrylic sheet. [3]

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(c) The perfume bottle pictured below was developed using 3D rapid prototyping. Discuss the advantages of using 3D rapid prototyping. [3]



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END OF PAPER

