OCR

Wednesday 4 June 2014 – Morning

GCSE DESIGN AND TECHNOLOGY Industrial Technology

A545/01 Sustainability and Technical Aspects of Designing and Making

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
None

Duration: 1 hour 30 minutes

* A 5 4 5 0 1 *

* 1 1 3 0 2 5 6 3 6 7 *

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.
- 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).
- Answer **all** the questions in Section A **and** Section B.
- 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 **80**.
- All dimensions are in millimetres.
- The quality of your written communication will be taken into account in marking your answers to the questions marked with an asterisk (*).
- This document consists of **16** pages. Any blank pages are indicated.

SECTION A

Answer **all** questions.

You are advised to spend 40 minutes on this section.

On questions 1 – 5 (circle) your answer.

1 The 6R rethink means:

(a) To think if a product can be used for a different purpose
(b) To think how a product can do its job better
(c) To think how a product can be exported
(d) To think how a product can be sold for more profit **[1]**

2 Solar power is:

(a) A renewable energy source
(b) A non-renewable energy source
(c) A recyclable form of energy
(d) A non-recyclable form of energy **[1]**

3 Conversion of waste products into new materials is called:

(a) Green energy
(b) Recycling
(c) Incineration
(d) Material waste **[1]**

4 On which material is the following recycling symbol found?

(a) Polystyrene
(b) Polyvinyl chloride
(c) Polypropylene
(d) Low density polyethylene **[1]**

5 Measures taken by companies to reduce their carbon footprint are called:

(a) Risk assessment
(b) Reforestation
(c) Carbon assessment
(d) Carbon offsetting **[1]**

6 Name the type of recycling that involves the second-hand use of a product.

..... **[1]**

7 Name the term used to describe the stages a product goes through from conception to decomposition.

..... **[1]**

8 State **one** way in which burning fossil fuels causes harm to the environment.

..... **[1]**

9 Name the 6R that describes when a product is mended.

..... **[1]**

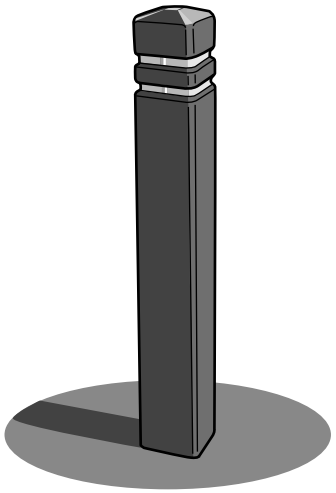
10 Give the term that means a product is designed to minimise its environmental impact.

..... **[1]**

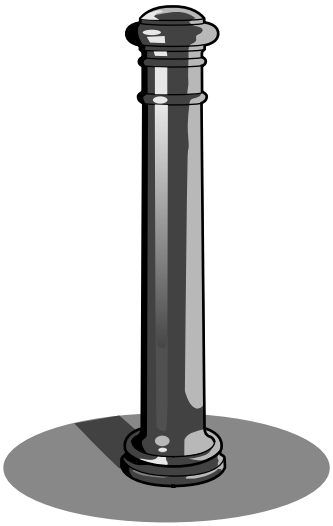
Decide whether the statements below are **true** or **false**.

Tick (✓) the box to show your answer.	**True**	**False**	
11 Reusing products is good for the environment.	☐	☐	**[1]**
12 The consumption of fossil fuels is likely to result in an energy crisis.	☐	☐	**[1]**
13 Hydro-power is non-renewable.	☐	☐	**[1]**
14 Built-in-obsolescence is environmentally friendly.	☐	☐	**[1]**
15 All thermoplastics can be recycled.	☐	☐	**[1]**

16 Fig. 1 shows two safety bollards.



Bollard A – made of plastic



Bollard B – made of cast aluminium

Fig. 1

(a) (i) Bollard **A** is made from recycled plastic products.

State the term used to describe this type of recycling.

..... **[1]**

(ii) Give **one** product that could be recycled to make Bollard **B**.

..... **[1]**

(b) Fig. 2 shows a wooden bollard.

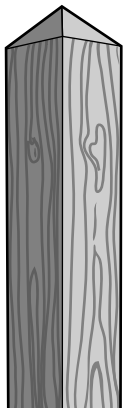


Fig. 2

(i) Explain how wood can be sustainably sourced.

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.....

..... **[2]**

(ii) The wooden bollard is to be used in a children's playground.

Use sketches and notes to show design modifications that will improve its:

- safety
- visibility
- appearance.

[4]

(c) Give **two** disadvantages of a wooden bollard compared to the plastic and aluminium bollards shown in Fig. 1.

1 .....

.....

2 .....

.....

[2]

(d) **(i)** The wooden bollard is to be manufactured locally.

Explain the benefits of manufacturing locally.

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.....

..... **[3]**

(ii) Give **one** reason why a company might choose to manufacture its products in the Far East.

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..... **[1]**

(e)* Explain the benefits to the environment of using recycled materials when making products.

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..... **[6]**

SECTION B

Answer **all** questions.

You are advised to spend 50 minutes on this section.

17 Fig. 3 shows a number of hand tools used in a school workshop.

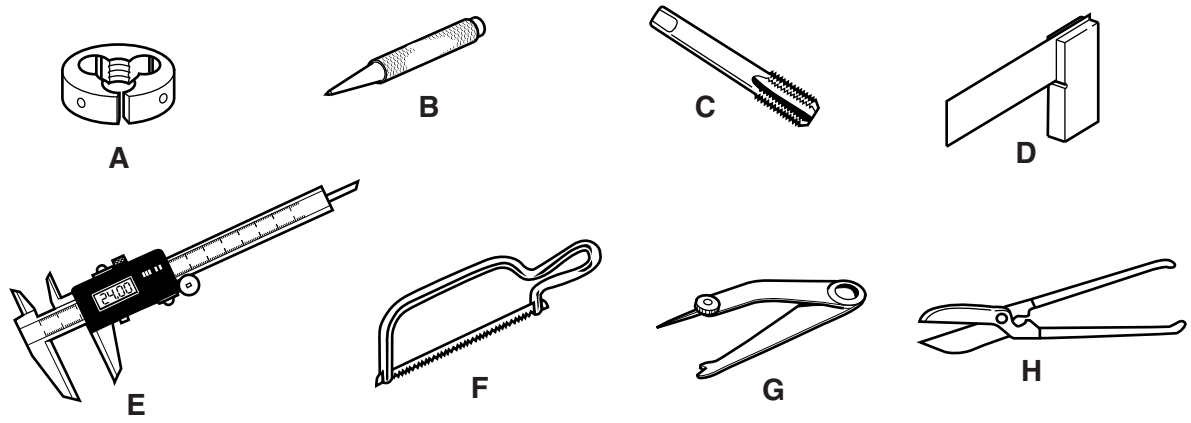

Fig. 3

(a) Complete the table below by showing which one of these tools should be used for each task.

The first one has been done for you.

Task	Tool used
Checking that the end of a piece of metal is square after filing it	**D**
Marking a line parallel to the edge of a piece of metal	
Cutting a thread in a hole	
Marking the position of a hole in a piece of metal before drilling it	
Cutting a piece off the end of a round metal rod 3mm thick	
Measuring the thickness of a piece of metal or plastic	

[5]

(b) Fig. 4 shows a centre lathe.

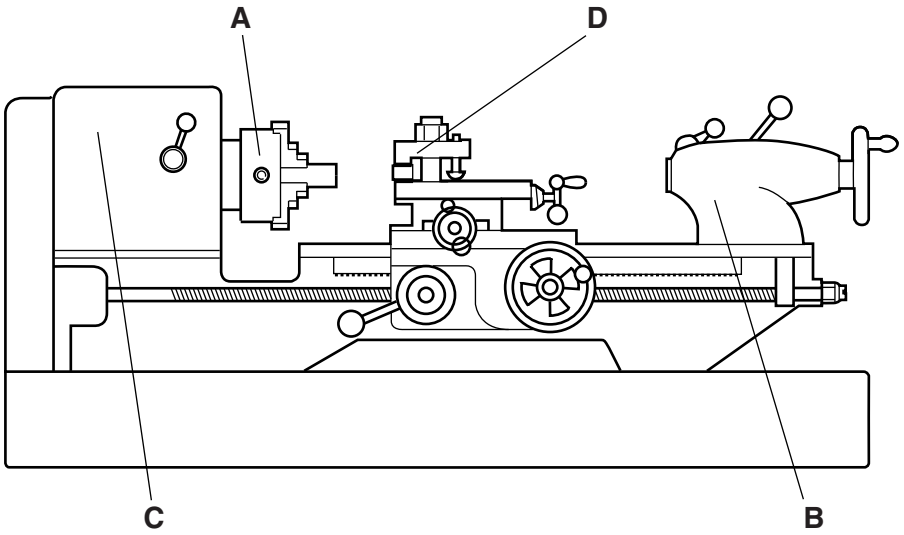

Fig. 4

(i) Name the **four** parts of the centre lathe labelled in Fig. 4.

A .....

B .....

C .....

D .....

[4]

(ii) Give **three** safety precautions that should be taken when using a centre lathe.

1 .....

2 .....

3 .....

[3]

(c) Explain the advantages of using Computer Numerically Controlled (CNC) machines compared with manually operated machines.

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..... **[3]**

18 Fig. 5 shows a menu holder with a vacuum formed plastic base.

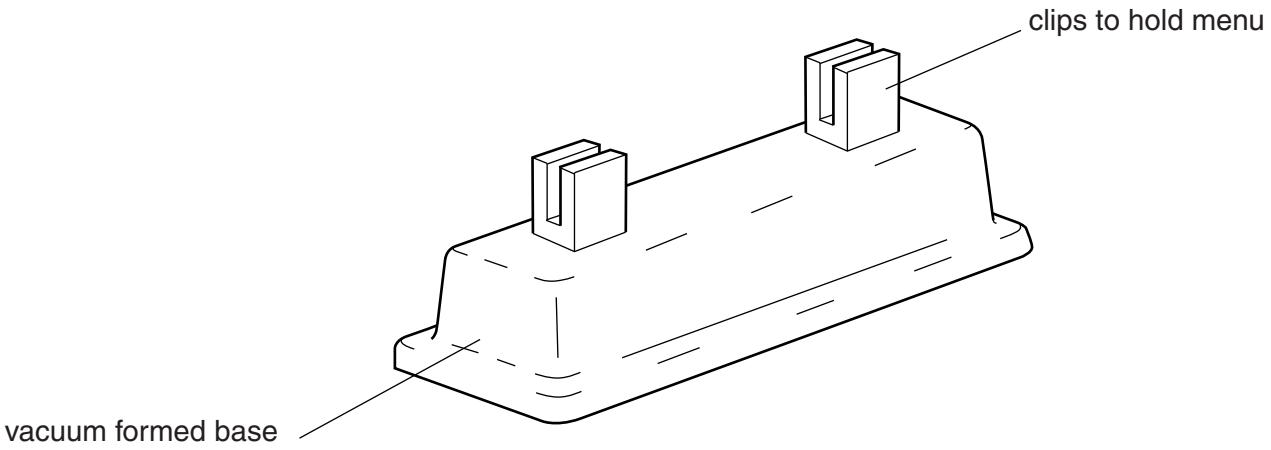

Fig. 5

(a) Complete the list below to give the stages needed to vacuum form the base shown in Fig. 5.

Stage 1 Place the mould in the vacuum forming machine

Stage 2 Clamp a sheet of plastic in place

Stage 3 .....

Stage 4 .....

Stage 5 .....

Stage 6 .....

Stage 7 Remove the finished vacuum formed base from the machine

Stage 8 Cut excess plastic away from the base

[4]

(b) Describe how CAD/CAM might be used to produce the mould for the vacuum formed plastic base.

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..... **[3]**

(c) Fig. 6 shows the finished base.

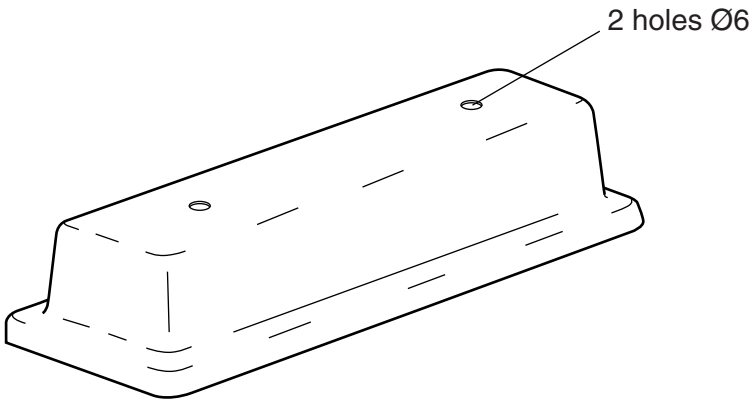

Fig. 6

Design a jig that could be used when drilling the Ø6 holes in the base.
The jig must:

- hold the base securely for drilling
- ensure that the holes are positioned accurately
- allow the holes to be drilled quickly and safely
- ensure that the base will not be damaged when being drilled.

[4]

(d) Fig. 7 shows another menu holder, also made of a thermoplastic material.

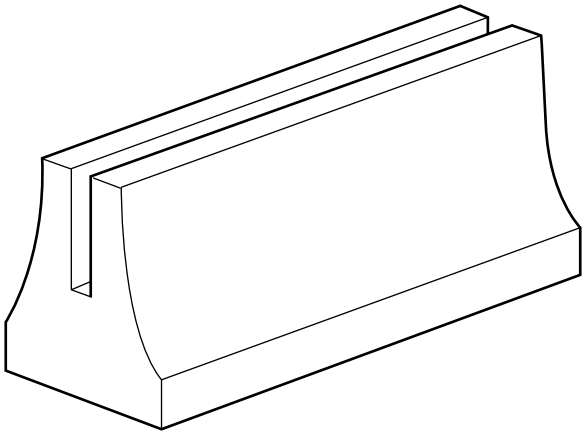

Fig. 7

(i) Give **three** benefits to a manufacturer of producing the menu holder shown in Fig. 7 rather than the one shown in Fig. 5.

1 .....

2 .....

3 .....

[3]

(ii) Name **one** industrial process that could be used for high-volume production of the menu holder shown in Fig. 7.

..... **[1]**

19 A list of materials is given below.

Brass	**GRP**
Carbon fibre	**HIPS**
Cast iron	**Polycarbonate**
Copper	**Stainless steel**

(a) Choose a suitable material from the list to complete each of the following statements.

1 ..... is a ferrous metal.

2 ..... is an alloy.

3 .....is a composite.

[3]

(b) Explain what is meant by the term 'non-ferrous alloy'.

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..... **[3]**

(c)* Explain the advantages and disadvantages of making products from plastics rather than metals.

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..... **[6]**

(d) Explain the benefits to a manufacturer of using the 'just in time' (JIT) system of manufacturing.

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..... **[3]**

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE