



Oxford Cambridge and RSA

Thursday 8 June 2017 – Afternoon

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



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. If additional space is required, you should use the lined pages at the end of this booklet. The question number(s) must be clearly shown.
- Answer **all** the questions in Section A **and** Section B.
- Do **not** write in the barcodes.

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 **20** 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 ETI stands for:

- (a) Ethical Trading Industry
- (b) Ethical Trading Innovation
- (c) Ethical Trading Initiative
- (d) Ethical Trading Institution

[1]

2 Chlorofluorocarbons cause damage to the:

- (a) Earth's core
- (b) Ozone layer
- (c) Sun
- (d) Alps

[1]

3 The term eco footprint refers to the:

- (a) Breakdown of the earth's atmosphere
- (b) Impact of reducing the use of nuclear energy
- (c) Measurement of our actions on the environment
- (d) Consequences of using thermoset plastics

[1]

4 Which of the following is a 'Green' energy source?

- (a) Coal
- (b) Geothermal
- (c) Nuclear
- (d) Oil

[1]

5 Recycled materials have:

- (a) Been used before
- (b) Never been used before
- (c) No economic value
- (d) Little or no use

[1]

6 Name **one** of the 6Rs.

..... [1]

7 State which recyclable plastic is known by the abbreviation PP.

..... [1]

8 Anthropometric charts list what kind of measurements?

..... [1]

9 Materials that respond to environmental changes are known as:

..... [1]

10 The second hand use of products is called:

..... [1]

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

Tick [✓] the box to show your answer.

	True	False	
11 Coal is a renewable fossil fuel.	<input type="checkbox"/>	<input type="checkbox"/>	[1]
12 Mild steel is not recyclable.	<input type="checkbox"/>	<input type="checkbox"/>	[1]
13 Tidal power is a renewable form of energy.	<input type="checkbox"/>	<input type="checkbox"/>	[1]
14 Reforestation is not sustainable.	<input type="checkbox"/>	<input type="checkbox"/>	[1]
15 A sweatshop is a business with poor working conditions.	<input type="checkbox"/>	<input type="checkbox"/>	[1]

16 Fig. 1 shows a bicycle with a frame made from an aluminium alloy.



Fig. 1

(a) The symbol shown below has been put on the bicycle.



(i) Give the name of the symbol.

..... [1]

(ii) Explain what the symbol signifies.

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

(b) Give **two** reasons why an aluminium alloy might be preferred to steel for making bicycle frames.

1

.....

.....

2

.....

.....

[4]

(c) Explain the importance of designing the bicycle so that it can be easily disassembled at the end of its useful life.

.....

.....

.....

.....

[3]

(d)* Bicycle frames are commonly made from aluminium alloy, carbon fibre, steel and sometimes wood.

Explain, using the example of a bicycle, how the choice of material for a product can impact on its carbon footprint.

[6]

(e) Fig. 2 shows a storage device for holding a bicycle by its top tube on a garage wall.

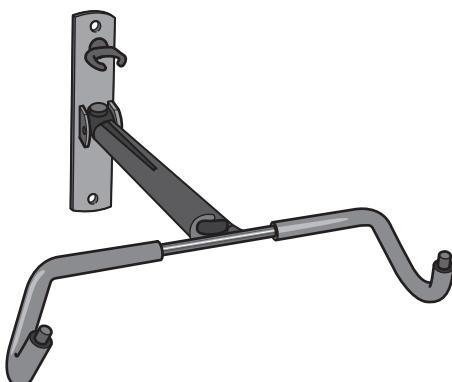


Fig. 2

Use sketches and notes to re-design the storage device so that it can hold two bicycles securely on a garage wall.

The storage device must:

- be able to be fixed securely to a wall
- hold two bicycles safely.

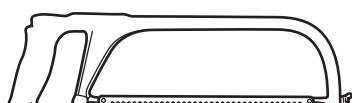
[4]

SECTION B

Answer **all** questions.

You are advised to spend 50 minutes on this section.

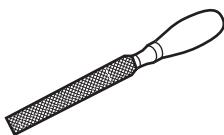
17 Fig. 3 shows a selection of tools used in a workshop.



Tool A



Tool B



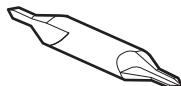
Tool C



Tool D



Tool E



Tool F



Tool G

Fig. 3

(a) Complete the list below by giving the correct name of each tool.

The first one has been done for you.

Tool A Hacksaw

Tool B

Tool C

Tool D

Tool E

Tool F

Tool G

[6]

(b) Complete the table below to show which tool from Fig. 3 would be used for the processes given.

The first one has been done for you.

Process	Tool
Checking an angle of 90 degrees	G
Marking a line on metal	
Shaping a curve at the end of a brass bar	
Drilling a centre hole on a lathe	
Drilling a hole in mild steel	

[4]

10

(c) Fig. 4 shows marking out on a piece of 5 mm thick mild steel plate.

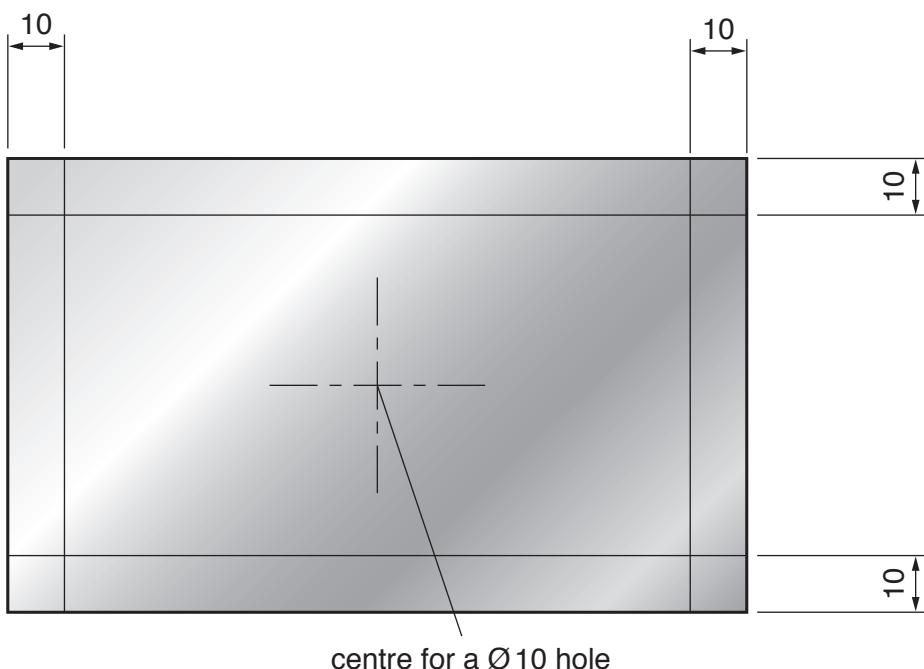


Fig. 4

(i) Name the fluid you brush onto metal to ensure that marking out lines stand out clearly.

[1]

(ii) Explain how you would mark out the lines on the steel plate shown in Fig. 4.

.....

.....

.....

.....

[3]

(d) Name the tool you should use to mark the centre of a hole before drilling.

[1]

18 A house sign is shown in Fig. 5. The sign has been made from aluminium alloy by the sand casting process.



Fig. 5

(a) (i) Give **two** reasons why sand casting is a suitable process for making the house sign shown in Fig. 5.

Reason 1.

Reason 2.

[2]

(ii) A pattern is used to make the mould for sand casting.

Give **two** important features of a sand casting pattern.

1

2

[2]

(b) Give **one** industrial process that could be used to produce aluminium alloy castings in large quantities.

..... [1]

12

(c) Injection moulding is used for the high-volume production of plastic products.

(i) Explain why injection moulding is only suitable for high-volume production.

.....
.....
.....
.....

[3]

(ii) Name **three** other plastic moulding processes.

1

2

3

[3]

(d) Give **two** reasons why a plastic might be used to make a product rather than a metal.

1

.....

2

.....

[4]

13

BLANK PAGE

Question 19 begins on page 14

PLEASE DO NOT WRITE ON THIS PAGE

14

19 Fig. 6 shows a hanging basket bracket. The bracket is made from 20 x 3 mild steel strip.

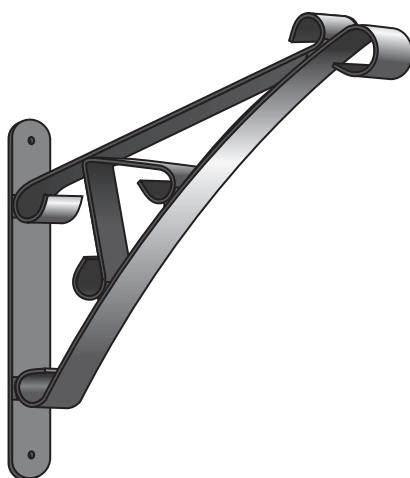


Fig. 6

(a) (i) Explain why mild steel is a suitable material for the hanging basket bracket.

.....

.....

.....

.....

.....

.....

[3]

(ii) Mild steel is a ferrous alloy.

Explain the term 'ferrous alloy'.

.....

.....

.....

[2]

15

(b) Use sketches and notes to show a design for a bending jig that could be used to produce the scrolls for the hanging basket bracket shown in Fig. 6.

The jig must:

- hold the mild steel strip firmly for making the scrolls
- produce a smooth curve on the ends of the scrolls
- allow the scrolls to be produced quickly.

[4]

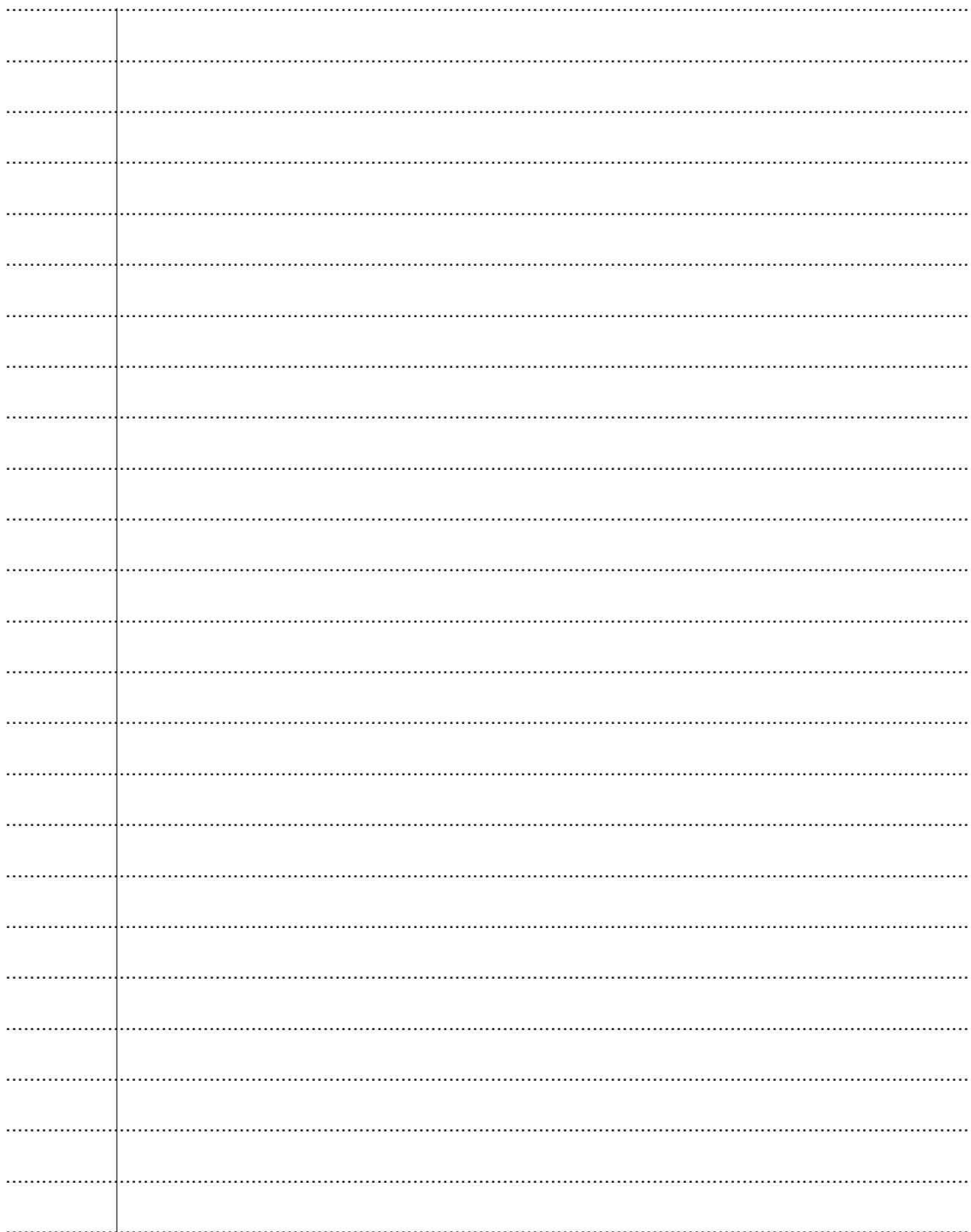
16

(c)* Discuss the issues a manufacturer should consider when changing from one-off production methods to high-volume production methods.

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).





This image shows a blank sheet of handwriting practice paper. It features a vertical red line on the left side, likely representing a margin. To the right of this margin, there are 22 horizontal grey lines spaced evenly down the page, intended for practicing letter formation and alignment.



This image shows a blank sheet of handwriting practice paper. It features a vertical red line on the left side, likely representing a margin. To the right of this margin, there are 22 horizontal grey lines spaced evenly down the page, intended for practicing letter formation and alignment.



Oxford Cambridge and RSA

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) 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 1GF.

For queries or further information, please contact the Copyright Team, The University, Trumpington Street, Cambridge CB3 9EE.

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.