OCR
Oxford Cambridge and RSA

Thursday 7 June 2018 – 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.
- 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 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**.
- Dimensions are in millimetres unless stated otherwise.
- Your quality of written communication is assessed in 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 Which of the following is **not** a renewable energy source?

(a) Wind

(b) Geothermal

(c) Oil

(d) Tidal

[1]

2 Reforestation is the term used to describe:

(a) Recording the cycle of a tree

(b) Removal of evergreen trees

(c) Reduction of tropical forests

(d) Restocking existing forests

[1]

3 Manufacturing a product to last for a certain length of time is termed built-in:

(a) Malfunction

(b) Breakdown

(c) Obsolescence

(d) Breakage

[1]

4 Ethical companies are often termed:

(a) Organic free

(b) Sweatshop free

(c) CFC free

(d) Plastic free

[1]

5 CO_2 is a:

(a) Greenhouse gas

(b) Finite energy resource

(c) Recyclable metal

(d) Recyclable plastic

[1]

6 CFCs (chlorofluorocarbons) are known to damage which layer of the earth's atmosphere?

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

7 What does ETI stand for?

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

8 Energy derived from the sun is known as:

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

9 Which 6R describes making a product with less material?

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

10 The term used to describe the manufacture of products in different parts of the world is:

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

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

Tick (✓) the box to show your answer.

		True	False	
11	Sustainable products are all made from wood.	☐	☐	**[1]**
12	Culture is the way that people behave and relate to one another.	☐	☐	**[1]**
13	Timber is biodegradable.	☐	☐	**[1]**
14	Products designed to be reused result in less waste.	☐	☐	**[1]**
15	Hydropower is produced by wind turbines.	☐	☐	**[1]**

16 Fig. 1 shows a fencing system made from recycled plastic bottles.

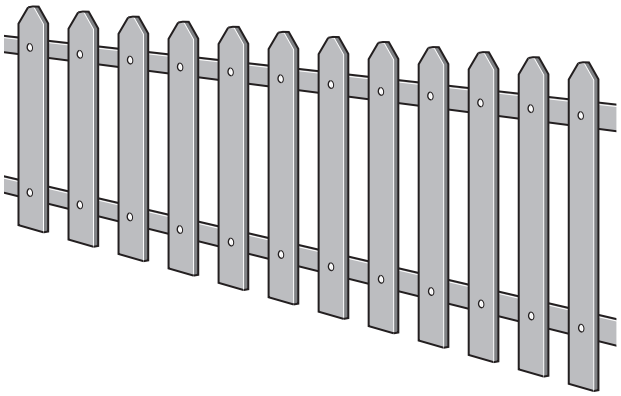


Fig. 1

(a) Explain **two** environmental benefits of using recycled plastic for making the fence shown in Fig. 1.

1 .....

.....

.....

2 .....

.....

..... **[4]**

(b) The manufacturer of the plastic fencing system has considered both its carbon footprint and carbon offsetting.

(i) Explain what 'carbon footprint' means.

.....

.....

.....

.....

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

(ii) Explain what 'carbon offsetting' means.

.....

.....

.....

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

(c) Fig. 2 shows a galvanised steel housing for anchoring a fencepost to a concrete base.

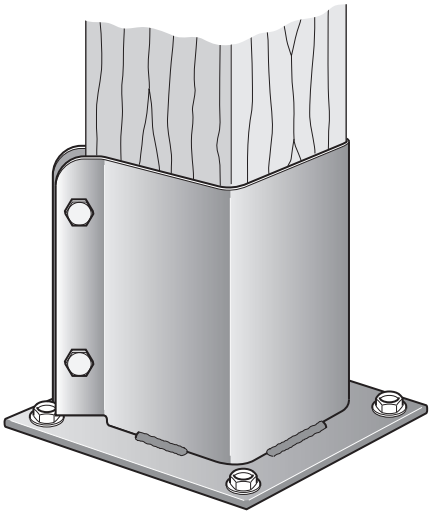


Fig. 2

The fencepost anchor shown in Fig. 2 is made from sheet steel that has been joined by welding.

Use sketches and notes to design an alternative fencepost anchor to be mass produced from recycled plastic.

The fencepost anchor must:

- be made from an appropriate recycled plastic
- use a minimum amount of material but still retain the necessary strength
- accommodate the post securely and be anchored to the concrete base.

[4]

(d)* Discuss, using examples, how a working knowledge of the 6Rs can help a designer lower the eco footprint of products.

.... **[6]**

SECTION B

Answer **all** questions.

You are advised to spend 50 minutes on this section.

17 (a) A list of different types of material is shown below.

Alloy
Ferrous metal
Non-ferrous metal
Thermoplastic

Complete the table below, by matching the correct type of material from the list above, with each of the materials named.
One has been completed for you.

Name of material	Type of material
Copper	Non-ferrous metal
Cast iron	
High Impact Polystyrene (HIPS)	
Brass	
Aluminium	
Acrylic	
Stainless steel	

[6]

(b) Give **two** reasons why thermoplastics are often used to make products instead of metals.

1 .....

.....

2 .....

.....

[2]

(c) Heat treatment processes can be used to alter the properties of some metals.

(i) Name **two** heat treatment processes.

1 .....

2 .....
[2]

(ii) Give **two** safety precautions that should be taken when using heat treatment processes.

1 .....

2 .....
[2]

(d) Explain what is meant by the term 'composite material' and give **one** example.

Explanation .....

.....

.....

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

18 Fig. 3 shows a simple bolt made in a school workshop. The parts of the bolt are made from mild steel.

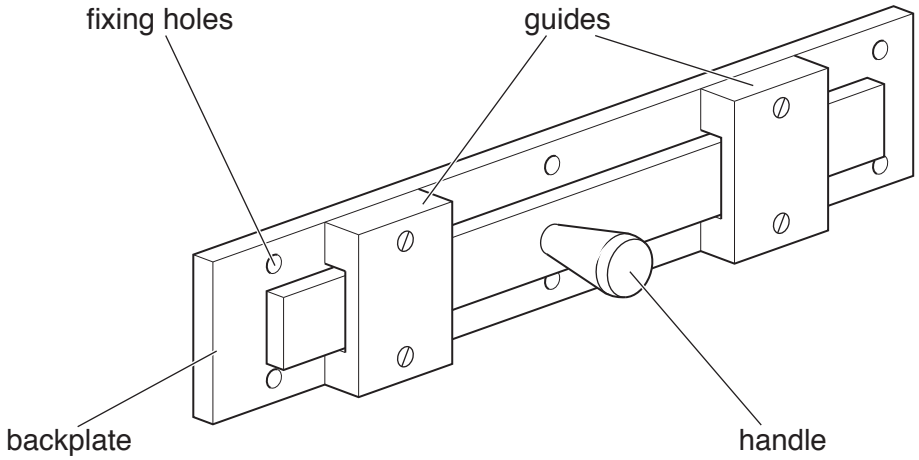


Fig. 3

(a) (i) Name **four** tools that might be used to mark the positions of the fixing holes in the backplate before drilling.

1 .....

2 .....

3 .....

4 .....

[4]

(ii) The guides are fixed to the backplate using M4 countersunk screws.

Name **three** methods, other than screws, of fixing the guides to the backplate.

1 .....

2 .....

3 .....

[3]

(b) An engineering drawing of the handle for the bolt in Fig. 3 is shown in Fig. 4 below.

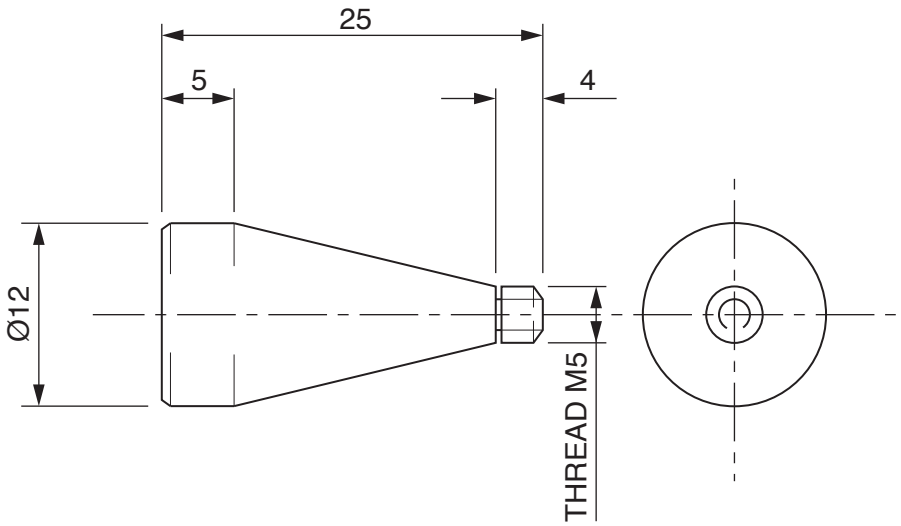
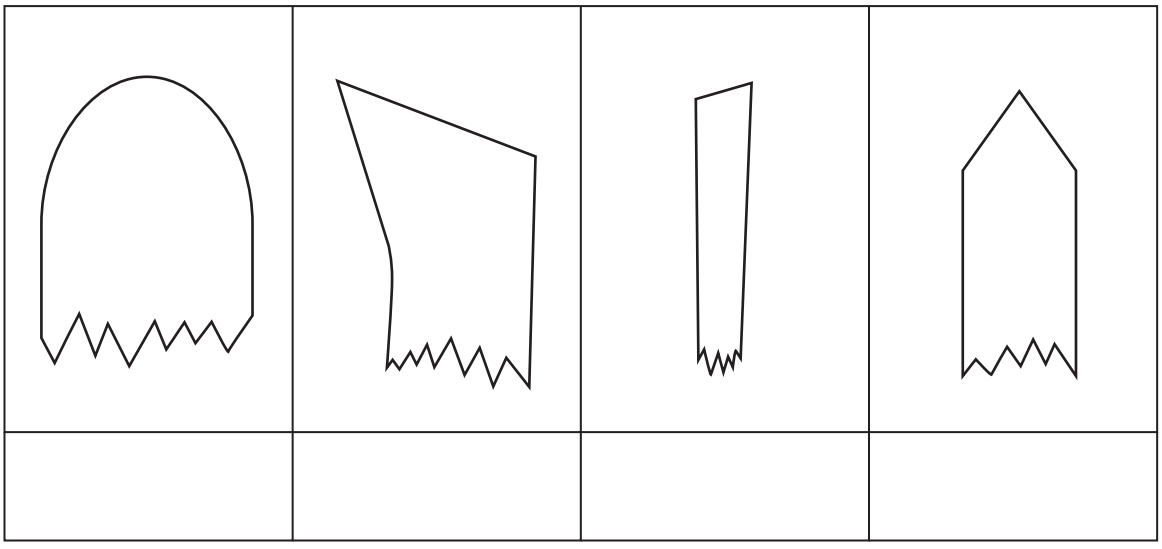


Fig. 4

The handle is made on a centre lathe.

(i) Place a tick (✓) in the chart below to show which lathe cutting tool shape would be best for producing a smooth surface on the Ø12 section of the handle.



[1]

(ii) Fig. 5 shows the parts of the centre lathe that control the movement of the cutting tool.

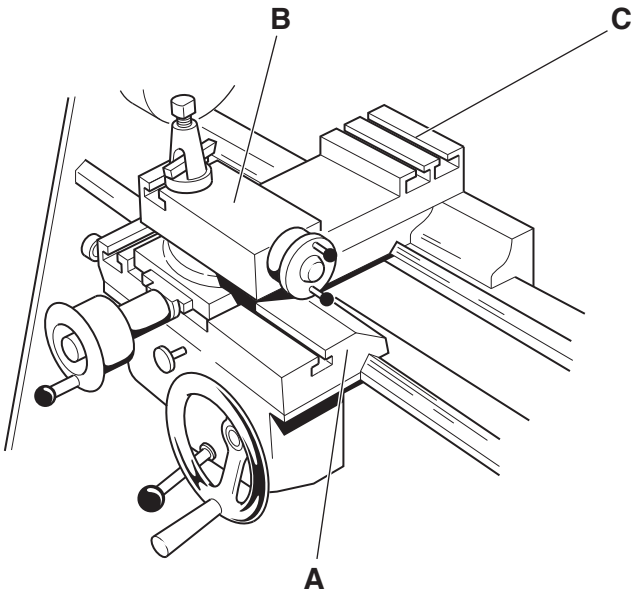


Fig. 5

Name the **three** parts of the centre lathe labelled in Fig. 5.

A .....

B .....

C .....

[3]

(iii) State which part of the centre lathe shown in Fig. 5 would need to be adjusted to produce the tapered section of the handle shown in Fig. 4.

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

(c) Give **three** safety precautions, other than using Personal Protective Equipment (PPE), that should be taken when operating a centre lathe.

1 .....

2 .....

3 .....

[3]

19 Fig. 6 shows a rack for DVDs and computer games. The rack is made from acrylic.

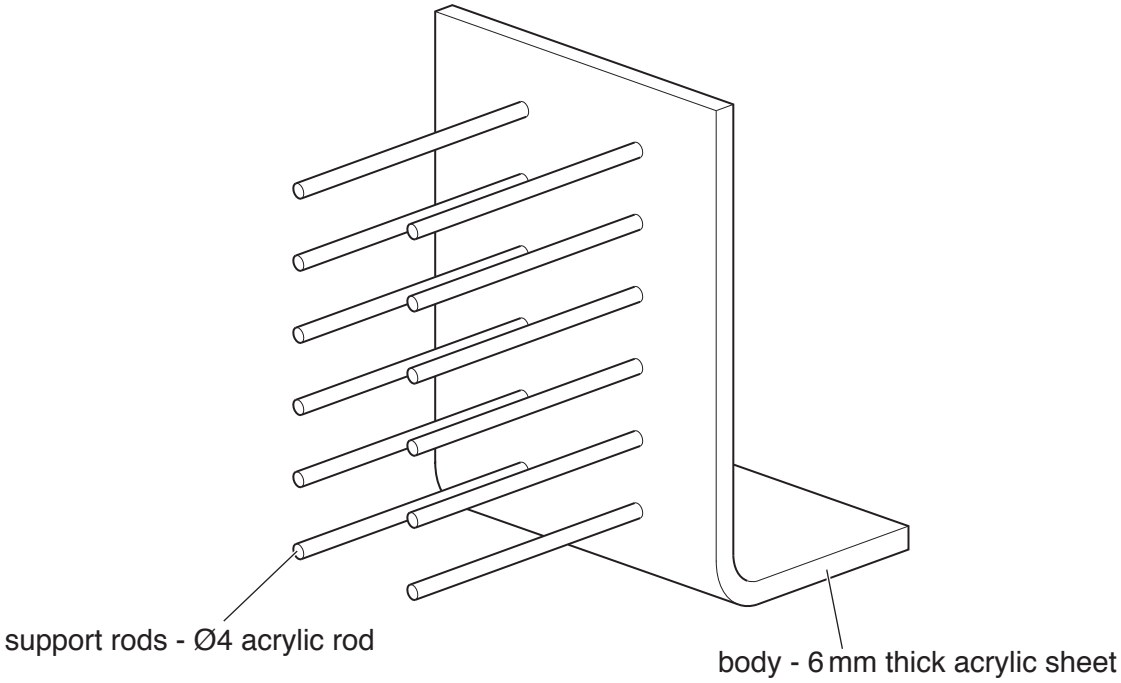


Fig. 6

(a) The body of the rack is moulded into shape by line bending.

Name **two** other plastic moulding processes.

1 .....

2 .....

[2]

(b) The rack shown in Fig. 6 is found to be unstable when used.

Use sketches and notes to show improvements to the rack.

The rack must:
- be stable
- prevent the DVDs sliding off
- give better support to the DVDs.

[4]

(c) A prototype of the new design is to be made before it is put into production.

Describe **one** rapid prototyping process that could be used.

.....

.....

.....

.....

.....

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

(d)* Modern technologies are widely used in industrial production.

Discuss, using examples, the impact of modern technologies on industrial production.

.... **[6]**

END OF QUESTION PAPER

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

PLEASE DO NOT WRITE ON THIS PAGE