

OCR

Oxford Cambridge and RSA

Thursday 9 June 2016 – 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	
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Centre number						Candidate number				
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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 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** Sustainable means:
- (a) Recycled
 - (b) Able to continue
 - (c) Refuse
 - (d) Limited life [1]
- 2** Tertiary recycling involves:
- (a) Giving old clothes to charity shops
 - (b) Sending waste to landfill sites
 - (c) Breaking down products and reformulating them
 - (d) Selling old products on the Internet [1]
- 3** Designing a product to last for a set period of time is called:
- (a) Green engineering
 - (b) Built-in obsolescence
 - (c) Product life cycle
 - (d) Eco-design [1]
- 4** Mild steel is:
- (a) A recyclable metal
 - (b) A non-recyclable metal
 - (c) A recyclable plastic
 - (d) A non-recyclable plastic [1]

- 5 The EU Ecolabel shows:
- (a) A product which has a smaller environmental impact than similar products
 - (b) A product which has been imported using 'green' fuel
 - (c) A product made entirely of recycled materials
 - (d) A product made using solar energy [1]

6 Name **one** thermosetting plastic.
 [1]

7 Taking products apart in order to recycle the materials is called:
 [1]

8 Name **one** source of green energy.
 [1]

9 Which 6R describes the process of making products that use less materials?
 [1]

10 A product that is designed to be thrown away after limited use is called:
 [1]

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

Tick (✓) the box to show your answer.

	True	False	
11 Biofuel is non-renewable.	<input type="checkbox"/>	<input type="checkbox"/>	[1]
12 All products that use recycled materials are poor quality.	<input type="checkbox"/>	<input type="checkbox"/>	[1]
13 Carbon offsetting helps to reduce a company's carbon footprint.	<input type="checkbox"/>	<input type="checkbox"/>	[1]
14 Fairtrade is not sustainable in the long term.	<input type="checkbox"/>	<input type="checkbox"/>	[1]
15 CFCs help protect the ozone layer.	<input type="checkbox"/>	<input type="checkbox"/>	[1]

16 Fig. 1 shows an electric car being charged. The car can travel up to 100 miles on a single charge.

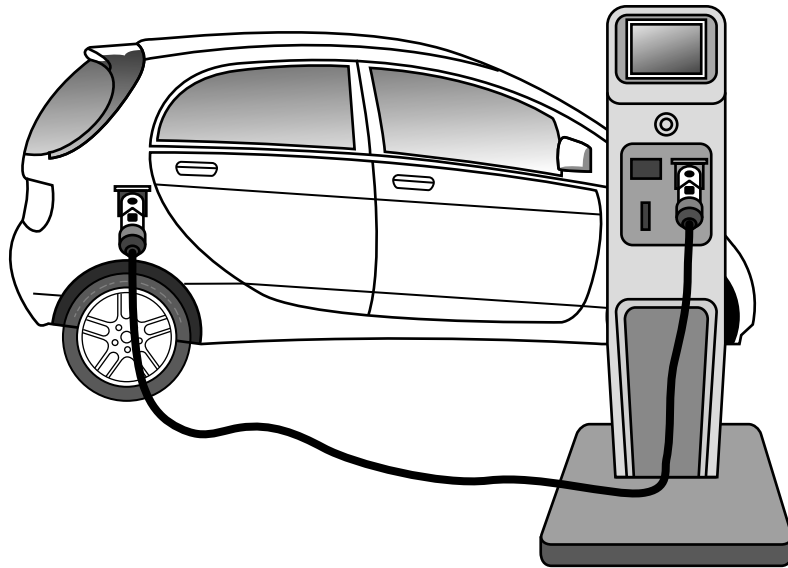


Fig. 1

(a) (i) Explain **one** environmental benefit of an electric car.

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

(ii) Explain **one** disadvantage of an electric car compared to a car powered by a fossil fuel.

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

(b) The body panels of the car shown in Fig. 1 are made from aluminium alloy.

Explain **two** environmental benefits of using aluminium alloy in a car.

1

.....

.....

.....

2

.....

.....

.....

[4]

(d) Fig. 2 shows a wall-mounted car charger.

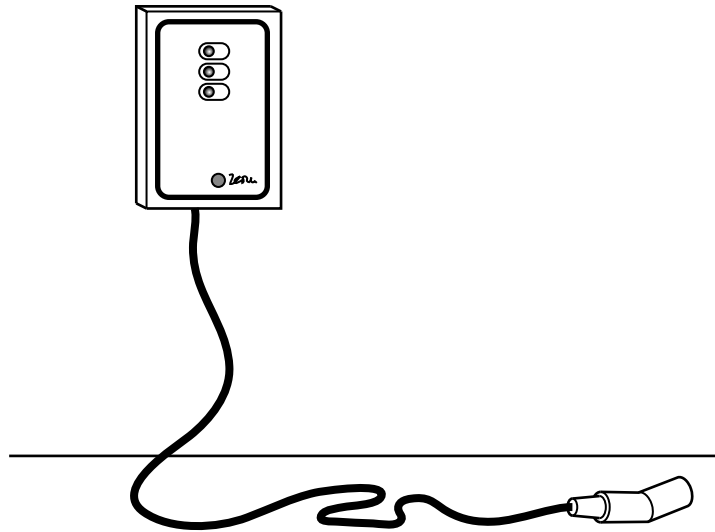


Fig. 2

Use sketches and notes to design a bracket which will allow the cable to be hung on a wall.

Your design should:

- Use an appropriate recyclable material
- Use a minimum amount of material
- Show how the bracket is attached securely to the wall.

(e) The recyclable parts of the electric car have recycling symbols on them.

Explain why this is important at the end of the car's life.

.....

.....

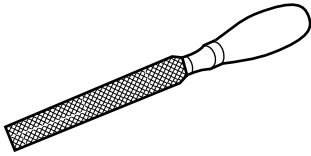
..... [2]

SECTION B

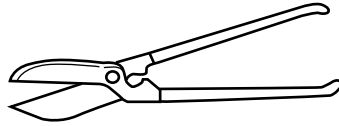
Answer **all** questions.

You are advised to spend 50 minutes on this section.

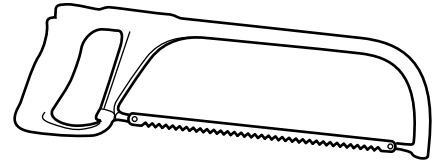
17 Fig. 3 shows a number of cutting tools.



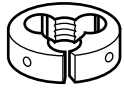
Tool A



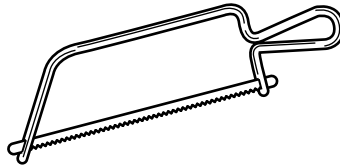
Tool B



Tool C



Tool D



Tool E



Tool F

Fig. 3

- (a) Complete the table below by giving the letter and correct name of the tool that should be used for each of the processes shown. The first one has been done for you.

Process	Tool used	Name of tool
Cutting through a piece of 6 mm thick mild steel	C	Hacksaw
Cutting a vacuum formed shape out of a sheet of 1 mm thick ABS		
Cutting a screw thread on a round mild steel bar		
Cutting through a piece of 3 mm diameter brass rod		

[6]

(b) A list of materials is given below.

Acrylic
Aluminium
Brass
Bronze
Cast Iron (CI)

Copper
Glass Reinforced Plastic (GRP)
High Speed Steel
Mild Steel

Polystyrene
Tin
Urea formaldehyde
Zinc
Nylon

Choose materials from the list to complete the following statements:

- (i) and are alloys. [2]
- (ii) and are ferrous metals. [2]
- (iii) and are thermoplastics. [2]

(c) Explain, using **one** example, why a product might be made from a plastic rather than a metal.

.....

.....

.....

..... [3]

18 Fig. 4 shows a mechanism for a moving display in a shop window. The mechanism is driven by a small electric motor.

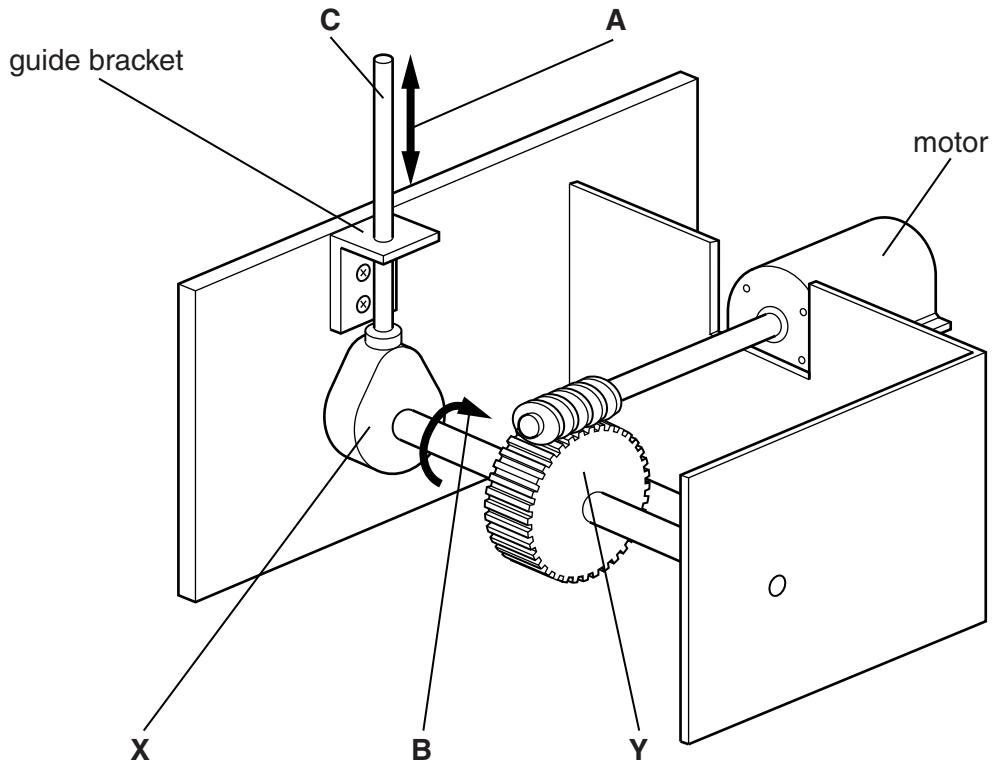


Fig. 4

(a) (i) Name the types of motion shown by the arrows **A** and **B**.

A

B

[2]

(ii) Name the part shown at **X**.

.....

[1]

(iii) Name the gear system shown at **Y**.

.....

[1]

(b) Describe **two** ways of making the vertical bar at point **C** move up and down more quickly.

1

.....

2

.....

[4]

(c) Fig. 5 shows the guide bracket for the mechanism and the blank for making it.

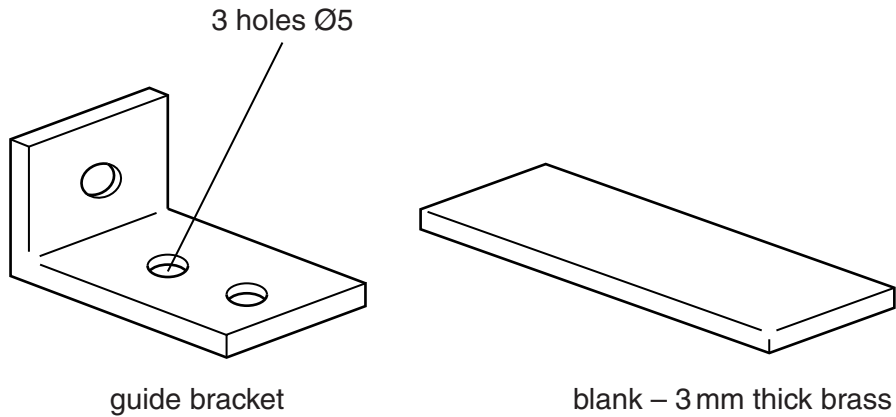


Fig. 5

(i) Complete the table below by giving the stages needed to mark out and drill the holes in the blank. Name the tools used for each stage. The first and last stages have been done for you.

	Stage	Tools used
1	Mark a centre line along the blank	Steel rule; odd-legged calipers
2		
3		
4	Drill the holes 5 mm diameter	Drill; drilling machine; vice

[4]

(ii) Give **two** reasons why brass is a suitable metal for making the guide bracket.

1

.....

2

.....

[2]

(iii) Name the process used to soften the brass before bending it into shape.

..... [1]

19 Fig. 6 shows a simple mixing tray made from vacuum formed High Impact Polystyrene (HIPS).

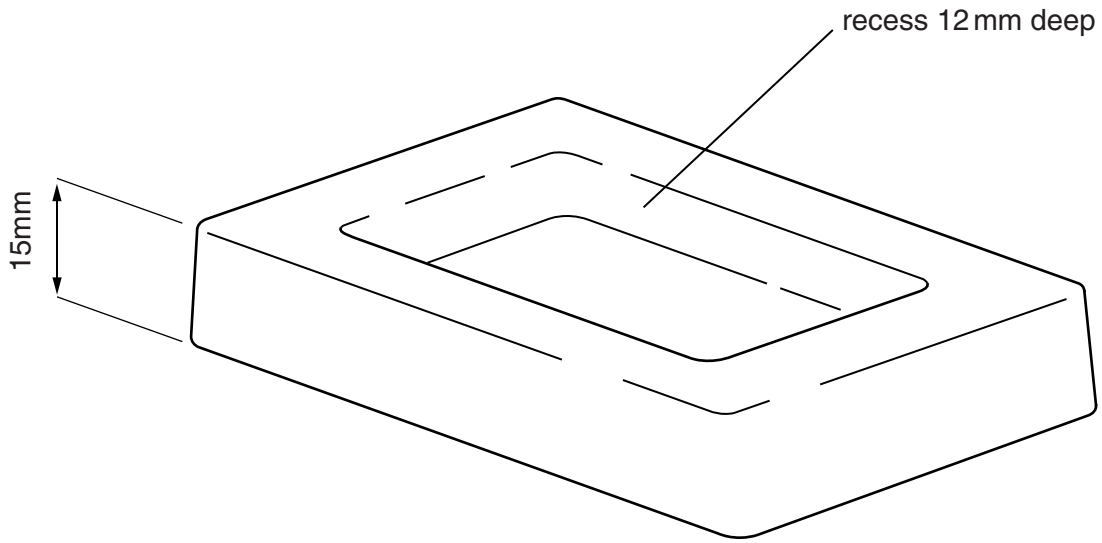


Fig. 6

(a) Give **two** reasons why HIPS is a suitable material for the mixing tray.

- 1
-
- 2
-

[2]

- (b) Use sketches and notes to show the design of the mould needed to vacuum form the mixing tray shown in Fig. 6.
Give details of important features and materials used.

[4]

- (c) Computer Aided Design (CAD) is used when designing new products and prototypes.
Give **three** benefits for a designer of using CAD.

1

.....

2

.....

3

.....

[3]

ADDITIONAL ANSWER SPACE

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

This section of the page is a large, empty area of lined paper. It features a vertical solid line on the left side, creating a margin. The rest of the page is filled with horizontal dotted lines, providing space for students to write their answers. The lines are evenly spaced and extend across the width of the page.

A large rectangular area consisting of horizontal dotted lines for writing, with a vertical solid line on the left side.



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