OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

GENERAL CERTIFICATE OF SECONDARY EDUCATION

DESIGN AND TECHNOLOGY: INDUSTRIAL TECHNOLOGY **J304**

Unit A545: Sustainability and technical aspects of designing and making

Candidates answer on the question paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Duration: 1 hour 30 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions in section A **and** section B.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.
- Do not write in Bar Codes.

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with an asterisk (*).
- The number of marks for each question is given in brackets **[ ]** at the end of the question or part question.
- Dimensions are in millimetres unless stated otherwise.
- The total number of marks for this paper is **80**.
- This document consists of **16** pages. Any blank pages are indicated.

For Examiner's Use		
	Max	**Mark**
1	**1**	
2	**1**	
3	**1**	
4	**1**	
5	**1**	
6	**1**	
7	**1**	
8	**1**	
9	**1**	
10	**1**	
11	**1**	
12	**1**	
13	**1**	
14	**1**	
15	**1**	
16	**20**	
17	**15**	
18	**15**	
19	**15**	
TOTAL	**80**	

Section A

Answer **all** questions.

For questions 1-5 circle your answer.

1 A business that makes products in many different countries is called a:

(a) World-wide distributor

(b) Global company

(c) World manufacturer

(d) Global player **[1]**

2 RoHS means:

(a) Royal Housing Sustainability

(b) Restrictions on the use of Hazardous Substances

(c) Regulations of Housing Sustainability

(d) Rules of Hazard use Standards **[1]**

3 Nanotechnology is the development of:

(a) Multi-functioning products

(b) Reliable and durable products

(c) Miniaturised products

(d) Easy to maintain and repair products **[1]**

4 The transportation of materials and products increases:

(a) Carbon offsetting

(b) Carbon handshake

(c) Carbon deposits

(d) Carbon footprint **[1]**

5 What does a photovoltaic cell use as a source of energy?

(a) Solar energy

(b) Wind energy

(c) Wave energy

(d) Tidal energy **[1]**

6 From designing, through making and distribution to the final disposal of an item is known as:

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

7 The disassembly of products so that materials can be reprocessed and reused is called:

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

8 What type of primary resource is iron ore?

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

9 What material is a product made from if it is marked with the symbol shown?

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

10 A material that naturally rots in the environment is called:

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

Decide whether the statement is **true** or **false**.

Tick (✓) the box to show your answer.

	True	**False**	
11 Thermosetting plastics can be recycled	☐	☐	**[1]**
12 All products have built in obsolescence	☐	☐	**[1]**
13 Waste from production should be reduced	☐	☐	**[1]**
14 Planting trees will offset carbon footprint	☐	☐	**[1]**
15 Modular design is better for servicing and repair	☐	☐	**[1]**

16 Fig. 1 shows two different types of chair. Chair **A** is made from polypropylene with a steel frame. Chair **B** is made from hardwood.

Chair **A**

Chair **B**

Fig. 1

(a) **(i)** State which chair is manufactured from renewable materials.

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

(ii) State **two** manufacturing processes used when making chair **A**.

1 .....

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

(iii) The seat of chair **A** has been designed using the measurements of people.
State the name given to these measurements.

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

(iv) The strength of chair **A** has been tested according to BS 4875.
State what BS stands for.

B .....S .....**[1]**

(b) The hardwood chair **B** is made from sustainable sources.

Describe what is meant by the term sustainable sources.

.....

.....

.....

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

(c) The polypropylene and steel chair **A** has a seat made from recycled materials.

Describe what is meant by the term 'recycled materials'.

.....

.....

.....

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

(d) Describe how chair **A** could be disposed of at the end of its life with minimum impact on the environment.

.....

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.....

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

(e) Explain how manufacturing chair **A** has an impact on its carbon footprint.

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

(f)* Chair **B** is made by workers in Indonesia.

Explain how the Ethical Trading Initiative (ETI) could support these workers.

Marks will be awarded for the quality of written communication in your answer.

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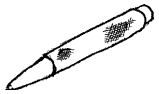
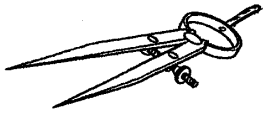
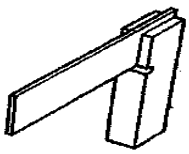
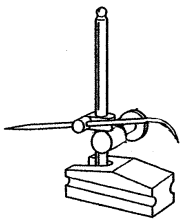
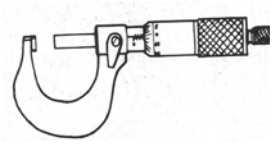
.....**[6]**

Section B
Answer **all** questions.

17 The table below shows tools used for measuring and marking out.

(a) Complete the table with the name of each tool and what the tool is used for.

The first one has been done for you.

TOOL	NAME OF TOOL	USE OF TOOL
	Centre Punch	Used to mark the centre of a hole before drilling
		
		
		Used on a surface plate for marking parallel lines
		

[7]

(b) Fig. 2 shows a plant pot holder that can be fixed to a wall.

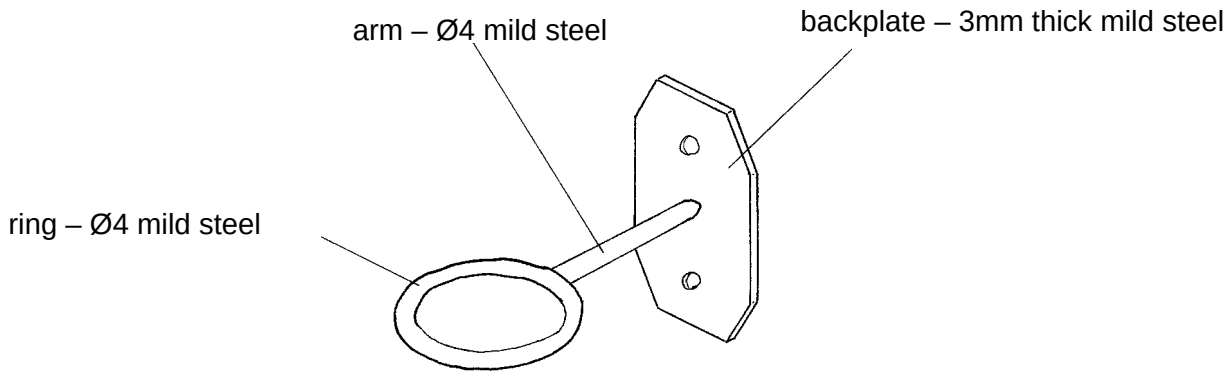


Fig. 2

(i) Complete the table below by giving the stages needed to produce **one** of the angled corners of the backplate shown in Fig. 2.

Give the names of tools or equipment used at each stage.

	Stage	**Tools or Equipment**
1	Apply marking fluid to the blank	Brush or marker pen
2	Mark the shape of the corner	
3		
4		
5	Remove burrs and marking fluid	Emery cloth

[5]

(ii) Name **two** processes that would be suitable for permanently joining the arm to the backplate.

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

2 ..... **[1]**

(iii) Give **one** suitable finish, other than paint, for the mild steel plant pot holder.

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

18 Fig. 3 shows a hosepipe support for use in the garden.

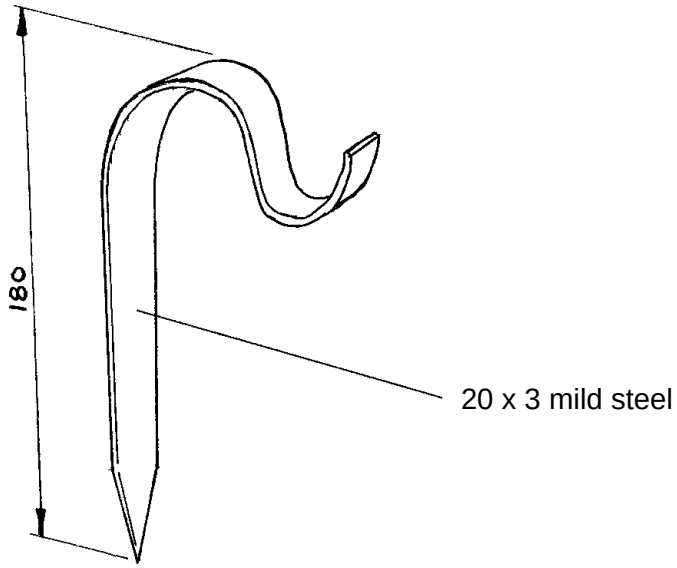


Fig. 3

(a) Give **two** reasons why mild steel is a suitable material for the hosepipe support.

1.....

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

(b) Mild steel is a ferrous alloy.

Explain the term ferrous alloy.

.....

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

(c) Use sketches and/or notes to describe **two** ways to stop the hosepipe support bending in use.

Method 1 Method 2

[4]

(d) Use sketches and notes to show a design for a bending jig that could be used to produce batches of the hosepipe support shown in Fig. 3.

The jig must:

- hold the mild steel strip firmly for bending
- ensure that all the hosepipe supports are identical
- allow the hosepipe supports to be produced quickly

[4]

(e) Bending is a metal forming process.

Name **three** other metal forming processes.

1.....

2.....

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

19 Fig.4 shows a charging station for a cordless telephone. The charging station is made from injection moulded plastic.

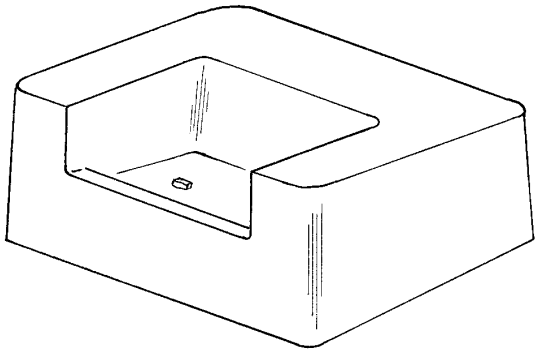


Fig. 4

(a) The charging station has been designed using CAD.

(i) State what the letters CAD stand for.

C.....A .....D..... **[1]**

(ii) Give **three** benefits to the designer of using CAD.

1 .....

.....

2 .....

.....

3 .....

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

(b) Name **two** specific plastics suitable for making the charging station shown in Fig. 4.

1.....

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

(c) Injection moulding is a plastics forming process.

Name **three** other industrial processes used for producing plastics products.

1.....

2.....

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

(d)* Discuss the issues a manufacturer should consider when introducing high-volume production methods.

Marks will be awarded for the quality of written communication in your answer.

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

END OF QUESTION PAPER

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OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

Sample Assessment Material

DESIGN AND TECHNOLOGY: INDUSTRIAL TECHNOLOGY

A545: Sustainability and technical aspects of designing and making

MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 80

DRAFT

This document consists of 12 pages

MARKING INSTRUCTIONS

PREPARATION FOR MARKING
SCORIS

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to scoris and mark the **required number** of practice responses ("scripts") and the **number of required** standardisation responses

   YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

TRADITIONAL

Before the Standardisation meeting you must mark at least 10 scripts from several centres. For this preliminary marking you should use **pencil** and follow the **mark scheme**. Bring these **marked scripts** to the meeting.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the scoris 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or the scoris messaging system, or by email.

5. Work crossed out:
   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks
   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.

7. There is a NR (No Response) option. Award NR (No Response)
   - if there is nothing written at all in the answer space
   - OR if there is a comment which does not in anyway relate to the question (e.g. 'can't do', 'don't know')
   - OR if there is a mark (e.g. a dash, a question mark) which isn't an attempt at the question

   Note: Award 0 marks - for an attempt that earns no credit (including copying out the question)

8. The scoris **comments box** is used by your team leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
   If you have any questions or comments for your team leader, use the phone, the scoris messaging system, or e-mail.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:
    a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
    b. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

Section A

Question			Answer	Marks	Guidance
1			(b) Global company	1	
2			(b) Restrictions on the use of Hazardous Substances	1	
3			(c) Miniaturised products	1	
4			(d) Carbon footprint	1	
5			(a) Solar energy	1	
6			Product life cycle	1	Accept - life cycle
7			Recycling	1	
8			Non-renewable	1	
9			Polystyrene	1	
10			Bio-degradable	1	
11			Thermosetting plastics can be recycled FALSE	1	
12			All products have built in obsolescence FALSE	1	
13			Waste from production should be reduced TRUE	1	

Question			Answer	Marks	Guidance
14			Planting trees will offset carbon footprint. TRUE	1	
15			Modular design is better for servicing and repair. TRUE	1	
			Total	**15**	

Question			Answer	Marks	Guidance
16	(a)	(i)	hardwood chair B	1	
		(ii)	Any two manufacturing processes: one mark each: Injection moulding metal forming (bending) fabrication (welding) surface protection of metal	2	Must relate to manufacturing stages
		(iii)	Anthropometric data or Anthropometrics	1	
		(iv)	British Standards	1	
	(b)		Max two marks for an accurate description: Made from timber where replanting of cut trees takes place (2) Made from reused timber (1).	2	
	(c)		Max two marks for an accurate description: Recycled materials are materials that were used in other products previously (1) and have been processed for use again in the same or another product (1).	2	
	(d)		Max two marks for an accurate description: The steel and polypropylene should be firstly separated and then sent for recycling (1). Polypropylene and steel can both be melted down and used again (1).	2	1 mark for separation. 1 mark for the fact that both materials are recyclable.
	(e)		Max three marks for an accurate explanation: Energy is required to bend the steel and weld parts together (1). Injection moulding the polypropylene uses energy (1) and so also contributes to the carbon footprint (1).	3	
16	(f)*		Up to six marks for an explanation of how ETI should support workers in Indonesia. Explanation may include: Safe and hygienic working conditions Living wage Sensible working hours Employment is freely chosen	6	**Level 3 (5-6 marks)** Thorough explanation, showing a good understanding of the issues. There will be three of more clearly identified and explained points. Specialist terms will be used appropriately and correctly. The information will be presented in a

			Child labour is prevented No discrimination or inhumane treatment Equality for men and women Regular employment		structured format. The candidate will demonstrate the accurate use of spelling, punctuation and grammar. **Level 2 (3-4 marks)** Adequate explanation, showing reasonable understanding of the issues. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, grammar and punctuation. **Level 1 (1-2 marks)** Basic explanation, showing some understanding of the issues. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised or 'list like'. Errors of grammar, punctuation and spelling may be intrusive. List of one or two points maximum one mark. List of three or more maximum two marks. 0 marks = no response or no response worthy of credit
			Total	**20**	

Section B

Question			Answers	Marks	Guidance
17	(a)		Dividers - Marking circles and curves Engineers (try) square - Checking/marking right angles Surface gauge/scribing block Micrometer - Accurately measuring thicknesses (7x1)	7	
	(b)	(i)	2 Scriber and steel rule 3 Cut off corner Hacksaw and vice 4 File to finished shape (flat) file and vice (5x1)	5	
		(ii)	Any two processes, one mark each: Brazing; welding; riveting; hard soldering (2x1)	2	
		(iii)	One suitable finish: Plastic/powder coating; plating	1	Accept oil-blueing/blackening
			Total	15	

Question			Answers	Marks	Guidance
18	(a)		Max two reasons, one mark each: Cheaper than most other metals; easy to work; stronger than most other metals; readily available/recyclable	2	Not simply 'cheap', 'strong' – response needs to be qualified
	(b)		Max two marks for an accurate description: Mixture of metals (1) containing iron (1)	2	
	(c)		Annotated sketch or adequate description (1) of a suitable solution (1) Increase thickness; add support; change shape of section; completely different design 2x(1+1)	4	
	(d)		Annotated sketch showing a workable design (1) One mark for each specification point met (3x1) (4x1)	4	
	(e)		Any three metal forming processes, one mark each: Forging; pressing/stamping; casting; extrusion (3x1)	3	
			Total	15	

Question			Answers	Marks	Guidance
19	(a)	(i)	Computer Aided Design	1	
		(ii)	Any three benefits to the designer, one mark each: Easy to make changes; ability to change views (3D); ability to 'import' features; easy to share designs (electronically); easy to save designs; use of 'cut and paste'	3	Not simply 'quick' or 'easy'
	(b)		Any two suitable plastics, one mark each: HIPS; ABS; Nylon/polyamide; PP	2	
	(c)		Any three other industrial processes, one mark each: Vacuum forming; extrusion; blow moulding; rotational moulding; line bending	3	

Question			Answer	Marks	Guidance
					Levels of response
19	**(d) ***		Up to six marks for a discussion or critical evaluation of the issues a manufacturer should consider when introducing high-volume production methods. Discussion may include consideration of the following points: Cost of special equipment/machines Energy costs Retraining of workforce for new skills Size of workforce Factory layout Cell or line production Computer networking Use of JIT - logistics Demand for output – maximising use of machines	**6**	**Level 3 (5-6 marks)** Shows clear understanding of high-volume production methods and gives details relating to the issues associated with introducing them. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar. **Level 2 (3-4 marks)** Shows some understanding of high-volume production methods and issues associated with introducing them. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, grammar and punctuation. **Level 1 (1-2 marks)** Shows limited understanding of high-volume production methods or issues associated with them. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of grammar, punctuation and spelling may be intrusive. 0 marks = no response or no response worthy of credit.
			Total	**15**	

Assessment Objective Grid					
GCSE Design & Technology: Industrial Technology					
Question		Recall, select and communicate	Apply knowledge, understanding and skills	Analyse and evaluate	Total
1		1			**1**
2		1			**1**
3		1			**1**
4		1			**1**
5		1			**1**
6		1			**1**
7		1			**1**
8		1			**1**
9		1			**1**
10		1			**1**
11		1			**1**
12		1			**1**
13			1		**1**
14		1			**1**
15			1		**1**
16ai				1	**1**
16aii		1		1	**2**
16aiii			1		**1**
16aiv		1			**1**
16b		2			**2**
16c		2			**2**
16d			1	1	**2**
16e				3	**3**
16f		6			**6**
17a		7			**7**
17bi		3	2		**5**
17bii		1	1		**2**
17biii			1		**1**
18a			1	1	**2**
18b		2			**2**
18c		2	1	1	**4**
18d		2	1	1	**4**
18e		3			**3**
19ai		1			**1**
19aii				3	**3**
19b		1	1		**2**
19c		3			**3**
19d*		2	2	2	**6**
Total		**52**	**14**	**14**	**80**