

General Certificate of Secondary Education

A542

**Design and Technology:
Industrial Technology**

Unit A542: Sustainable Design

Specimen Paper

Time: 1 hour

Candidates answer on the question paper.

Additional materials:

Candidate
Forename

Candidate
Surname

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name 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 you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do not write in the bar codes.
- Do not write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is 60.

FOR EXAMINER'S USE

1		7		13	
2		8		14	
3		9		15	
4		10		16	
5		11		17	
6		12		18	
TOTAL					

This document consists of **9** printed pages and **3** blank pages.

Section A

Answer **all** questions.

1 This symbol stands for:



- (a) School safety policy
- (b) British safety consideration
- (c) British safety institute
- (d) British standards institute

[1]

2 The abbreviation of **COSHH** stands for:

- (a) Centre of social health hygiene
- (b) Central office supporting health hazards
- (c) Control of substances hazardous to health
- (d) Central office substances hazardous to health

[1]

3 Which of the following is **not** a renewable energy resource?

- (a) water
- (b) coal
- (c) wind
- (d) solar power

[1]

4 Biodegradable means that it can:

- (a) grow naturally in the environment
- (b) naturally rot in the environment
- (c) be reusable as a different product
- (d) not grow naturally in the environment

[1]

5 The role of a designer of sustainable products is to:

- (a) create innovative sustainable designs
- (b) modify existing designs
- (c) use traditional designs
- (d) design products that can be bought cheaply

[1]

6 In the space below draw the symbol that would be found on a product that can be recycled.

[1]

- 7 The term recycling means to a product. [1]
- 8 State what is meant by a product being 'Fair trade'
..... [1]
- 9 What is the term given to the appearance of an object including its shape, colour and texture?
..... [1]
- 10 What is the name given to the collection of data on human body measurements?
..... [1]

Decide whether each of the following statements is *true* or *false*.

- | | True | False |
|---|--------------------------|--------------------------|
| 11 Smart materials are materials whose properties can change due to changes in pressure, force, light or temperature. | <input type="checkbox"/> | <input type="checkbox"/> |
| 12 A renewable source is one that cannot be renewed within 50 years. | <input type="checkbox"/> | <input type="checkbox"/> |
| 13 Chemicals that can cause harm to people and animals are called bio products. | <input type="checkbox"/> | <input type="checkbox"/> |
| 14 Job production is used to make large batches of products. | <input type="checkbox"/> | <input type="checkbox"/> |
| 15 Ethical trading is a term used to show that the basic rights of the employees are protected. | <input type="checkbox"/> | <input type="checkbox"/> |

[5]

Section A Total [15]

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Section B

Eco design is about designing a product with the environment in mind and trying to minimise the damage to the environment throughout a product's life cycle.

A designer must think about the impact on the environment.

16 (a) Explain what the following areas are in the design process.

Product planning:

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

Development:

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

Functionality:

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

Safety:

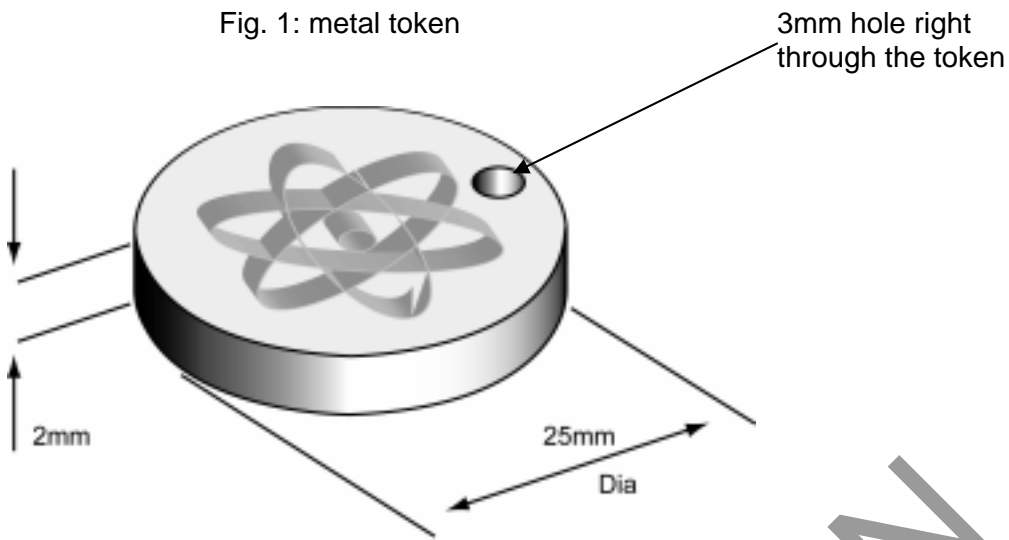
.....
.....
.....
..... [2]

Aesthetics:

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

SPECIMEN

A manufacturer wishes to develop a tool for making circular metal tokens, as shown in Fig. 1, to be used at the Science Museum in London.



Token to be made from Aluminium

(b) Name the type of tool.

..... [1]

(c) Identify **four** specification points for your design of tool.

1 [1]

2 [1]

3 [1]

4 [1]

..... [1]

..... [1]

..... [1]

..... [1]

Total [15]

Initial Ideas

17 (a) Use sketches and notes to show your initial ideas for your tooling.

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(b) Use notes and sketches to develop **one** of your initial ideas.

[5]

(c) With reference to the 6Rs select and describe **two** ways in which your tool could address **two** of these issues.

1 [2]

2 [2]

Total [15]

18 (a) (i) Give a suitable technique/method of construction for your tool design.

..... [1]

(ii) Describe **four** stages relevant to this technique/method.

1 [1]
.....

2 [1]
.....

3 [1]
.....

4 [1]
.....

(b) Name a piece of equipment that would be needed for your technique/method.

..... [1]

(c) Give **two** safety precautions that should be taken into account when using tools and equipment.

1 [1]
.....

2 [1]
.....

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Section A		
Question Number	Answer	Max Mark
1	This symbol stands for: D	[1]
2	The abbreviation of COSHH stands for: C	[1]
3	Which of the following is not a renewable energy resource? B	[1]
4	Biodegradable means that it can: B	[1]
5	The role of a designer of sustainable products is to: A	[1]
6	In the space below draw the symbol that would be found on a product that can be recycled.  Accept variations of this symbol – e.g. without the shading	[1]
7	The term recycling means to a product. re-use	[1]
8	State what is meant by a product being 'Fair trade' fair wages for the workers in less economically developed countries (LEDC's)	[1]
9	What is the term given to the appearance of an object including its shape, colour and texture? aesthetics	[1]
10	What is the name given to the collection of data on human body measurements? anthropometrics	[1]

Question Number	Answer	Max Mark
11	Smart materials are materials whose properties can change due to changes in pressure, force, light or temperature. true	[1]
12	A renewable source is one that cannot be renewed within 50 years. false	[1]
13	Chemicals that can cause harm to people and animals are called bio products. false	[1]
14	Job production is used to make large batches of products. false	[1]
15	Ethical trading is a term used to show that the basic rights of the employees are protected. true	[1]
Section A Total		[15]

Section B		
Question Number	Answer	Max Mark
16(a)	<p>Eco design is about designing a product with the environment in mind and trying to minimise the damage to the environment throughout a product's life cycle.</p> <p>A designer must think about the impact on the environment. Explain what the following areas are in the design process.</p> <p>Two marks for each section.</p> <p>Product Planning: 2x1 [2]</p> <ul style="list-style-type: none"> • Research, analysis of existing tooling. • Technical data of product. • Disassembly of existing tooling. • Properties required by product. • Choosing right materials & components. • Method of manufacture. • Tools & equipment needed. <p>Development: 2x1 [2]</p> <ul style="list-style-type: none"> • Changing an aspect or all of the design; materials, fastenings, size etc. • Improving the mechanical advantage. • Adding extra features. • Range of ideas. <p>Functionality: 2x1 [2]</p> <ul style="list-style-type: none"> • Is it fit /capable for its intended purpose/ use? • Ease of manufacture. • Works efficiently. • Suitable for repetitive use. <p>Safety: 2x1 [2]</p> <ul style="list-style-type: none"> • Safe use & disposal of waste. • Guarding. • Safety standards- labelling BSI etc. • Safety in the workplace & safety of workers when making. • Safety of user. <p>Aesthetics: 2x1 [2]</p> <ul style="list-style-type: none"> • The look / appearance of the product. • Properties of product- form, finish etc. 	[10]
16(b)	<p>Name the type of tool.</p> <p>One mark for any suitable tool.</p>	[1]

Question Number	Answer	Max Mark
16(c)	<p>Identify <u>four</u> specification points for your design of tool. One mark for each specification point. Max four. 1x4 [4]</p> <p>Generic design points e.g. 'cheap', 'durable', 'light' etc NOT acceptable</p> <ul style="list-style-type: none"> • User. • Size range, ergonomic/ anthropometrics. • Material properties. • Maintenance. • Finish. • Components required. • Production/ manufacturing methods. • Product and waste removal. • Easily modified for production. 	[4]
17(a)	<p>Use sketches and notes to show your initial ideas for your chosen tooling. Maximum of six marks. 6x1 [6]</p> <ul style="list-style-type: none"> • Design idea with no notes/ annotation. • One idea with labelling. • More than one idea with notes. • A range of design solutions & annotation. • A range of design solutions, annotation and colour. • A very well drawn & creative range with annotation. 	[6]
17(b)	<p>Use notes and sketches to develop <u>one</u> of your initial ideas. Answers must reflect the product focus & refer to 'design need'. Maximum of five marks. 5x1[5]</p> <ul style="list-style-type: none"> • One developed solution showing an idea from the initial ideas with some development but no annotation • One developed idea with notes • Clear & annotated development of an idea. • Idea & annotation that refers / links to specification points • Idea & annotation that refers to three specification points <p>Points to consider: Front & back views. Mechanism Techniques/ methods identified Sizes/ measurements Materials, fastenings, components Finishing Costing</p>	[5]

Question Number	Answer	Max Mark
17(c)	<p>With reference to the 6Rs select and describe <u>two</u> ways in which your tool could address <u>two</u> of these issues. Credit any reference to any two of the 6Rs. 2x2 [4]</p> <ul style="list-style-type: none"> • Recycle - material, product, disassembly, waste • Re-use - re-tooling. • Reduce - production process, costs, wastage materials, transport, life cycle. • Refuse - use of sustainable materials, biodegradable. Materials we should refuse to use. • Rethink - materials & components used, purpose of product. • Repair - fixing products. 	[4]
18(a)(i)	<p>Give a suitable technique/method of construction for your tool design. Any one suitable technique or method.</p>	[1]
18(a)(ii)	<p>Describe <u>four</u> stages relevant to this technique/method. Four marks for description of relevant stages relating to i) technique or method selected. 4x1[4]</p> <ul style="list-style-type: none"> • Preparation of materials. • Specialist tools & equipment. • Method of making / process referring to specialist terminology. • Finishing. 	[4]
18(b)	<p>Name a piece of equipment that would be needed for your technique/method. Any one suitable / relevant piece of specialist equipment needed for (a)(ii). Do not credit any repeats from (a)(ii).</p>	[1]
18(c)	<p>Give <u>two</u> safety precautions that should be taken into account when using tools and equipment. Two marks: 2x1[2]</p> <ul style="list-style-type: none"> • Storage and use of cutting fluids and lubricants. • Protective clothing • Safety labelling • Safety of machinery 	[2]

Question Number	Answer	Max Mark
18(d)*	<p>Machine tooling can wear after repeated use in manufacturing products.</p> <p>Discuss ways that wear can be minimised.</p> <p>Lubrication Planned maintenance Adjustments Appropriately hardened surfaces Appropriate use/abuse Correct choice of stock material</p> <p>Level 1 (0-2 marks) Basic discussion, showing some understanding of the ways tools can wear. Can provide a basic understanding why this is the case. 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.</p> <p>Level 2 (3-5 marks) Adequate discussion, showing an understanding of the ways tools can wear. Can provide an adequate understanding why this is the case. 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</p> <p>Level 3 (6-7 marks) Thorough discussion, showing a clear understanding of the ways tools can wear. Can provide a thorough understanding why this is the case. 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.</p>	[7]
	Section B Total	[45]
	Paper Total	[60]

Assessment Objectives Grid (includes QWC)

Question	AO1	AO2	AO3	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
16	10	5		15
17		11	4	15
18	12	3		15
TOTAL	29	20	11	60