



Rewarding Learning

**General Certificate of Secondary Education
2023**

Technology and Design

Unit 1: Technology and
Design Core Content

[GTY11]

WEDNESDAY 14 JUNE, MORNING

**MARK
SCHEME**

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses. The mark schemes should be read in conjunction with these general marking instructions..

Assessment objectives

Below are the assessment objectives for GCSE Technology and Design.

Candidates must:

- AO1** Recall, select and communicate their knowledge and understanding of Technology and Design in a range of contexts;
- AO2** Apply skills knowledge and understanding, including quality standards in a variety of design contexts. Plan and carry out investigations and making tasks involving an appropriate range of tools, equipment, materials and processes; and
- AO3** Analyse and evaluate evidence, design proposals and outcomes, make reasoned judgements and present conclusions and recommendations.

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of an unanticipated answer, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive Marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate..

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Types of mark schemes

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response

Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the 'best fit' bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- **Threshold performance:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- **Intermediate Performance:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.
- **High Performance:** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Marking calculations

In marking answers involving calculations, examiners should apply the “own figure rule” so that candidates are not penalised more than once for a computational error.

Quality of written communication

Quality of written communication is taken into account in assessing candidates’ responses to all tasks and questions that require them to respond in written form. These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level 1: Quality of written communication is limited.

Level 2: Quality of written communication is satisfactory.

Level 3: Quality of written communication is very good.

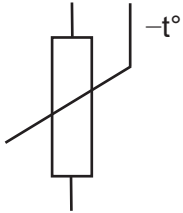
In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

Level 1 (Limited): The level of accuracy of presentation, spelling, punctuation and grammar is limited. The candidate makes a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary.

Level 2 (Satisfactory): The level of accuracy of presentation, spelling, punctuation and grammar is satisfactory. The candidate makes a satisfactory selection and use of an appropriate form and style of writing supported with appropriate use of diagrams as required. Relevant material is organised with some clarity and coherence. There is some use of specialist vocabulary.

Level 3 (Very Good): The level of accuracy of presentation, spelling, punctuation and grammar is very good. The candidate successfully selects and uses the most appropriate form and style of writing, supported with precise and accurate use of diagrams where appropriate. Organisation of relevant material is very good. There is very good use of appropriate specialist vocabulary.

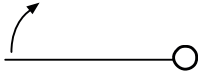
1 (a)



[1]

Electronic

[1]



[1]

Electricity or Electrical

[1]

Pneumatic

[1]

Roller Trip

[1]

Flowchart

[1]

Decision or Compare

[1]

(b) (i) $R = V/I$

[1]

(ii) V: Voltage or Volts/derivatives or Potential difference

[1]

I: Current or Amps/derivatives

[1]

R: Resistance or Ohms/derivatives

[1]

12

2 (a) Polyvinyl chloride [1]

Because it is thermoplastic [2]

or

Softens when heat is applied [1] allowing it to be shaped before cooling [1]

[3]

- (b)
- Reference to mould fabrication/preparation.
 - Insert the mould into the vacuum former.
 - Reference to fitting/placing plastic into machine.
 - Pull/slide the heater over the plastic. Switch on heater.
 - When the plastic sheet is soft push/slide the heater back.
 - Raise the mould/platform up in plastic sheet.
 - Turn on vacuum pump.
 - Lower the platform. Turn off vacuum pump.
 - Allow plastic to cool.
 - Remove the plastic/mould from vacuum former.
 - Remove the vacuum formed product from the mould.
 - Cut out the shape.

(4 × [1] in order)

[4]

All relevant, valid responses will be given credit

7

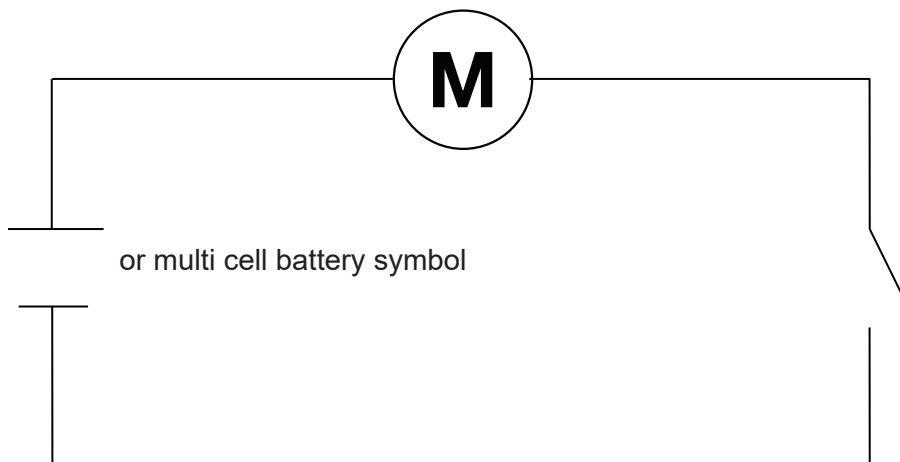
			AVAILABLE MARKS
3	<p>(i) A = Anticlockwise [1] C = Anticlockwise [1] D = Downwards [1] E = Upwards [1]</p> <p>(ii) $15/25 = 0.6$ [1] $30/0.6 = 50$ [1] rev/min [1]</p>	<p>[4]</p> <p>[3]</p>	7
4	<p>(a) Exhaust [1] Shuttle Valve [1] Single Acting Cylinder [1]</p> <p>(b) (i) A - Push Button [1] B - Lever [1]</p> <p>(ii) A: when button A is pushed it will switch on a valve [1] when the button is released the valve will switch off [1] B: when the lever is operated it will switch on a valve [1] the lever must be operated again to switch the valve off [1]</p>	<p>[3]</p> <p>[2]</p> <p>[4]</p>	9
5	<p>(a) A good conductor of heat [1] Used to mark lines on wood [1] A manufactured board [1] Heating to cherry red and quenching in cold water [1] Thermosetting plastic [1]</p> <p>(b) Wasting is the removal of some material [1] whereas joining is attaching materials together [1] wasting: cutting, turning, drilling, filing, milling, shearing, machining, chiselling, grinding – any 2 × [1] All relevant, valid responses will be given credit</p>	<p>[5]</p> <p>[2]</p> <p>[2]</p>	9

6 (a) (i) A = Toggle switch or spst switch or spdt Switch [1]
 B = Multi cell Battery [1] or Battery [1]
 C = Motor [1]
 (3 × [1]) [3]

(ii) Component C or the motor [1]

(iii) By the operation of Component A or the Toggle Switch [1]

(b)

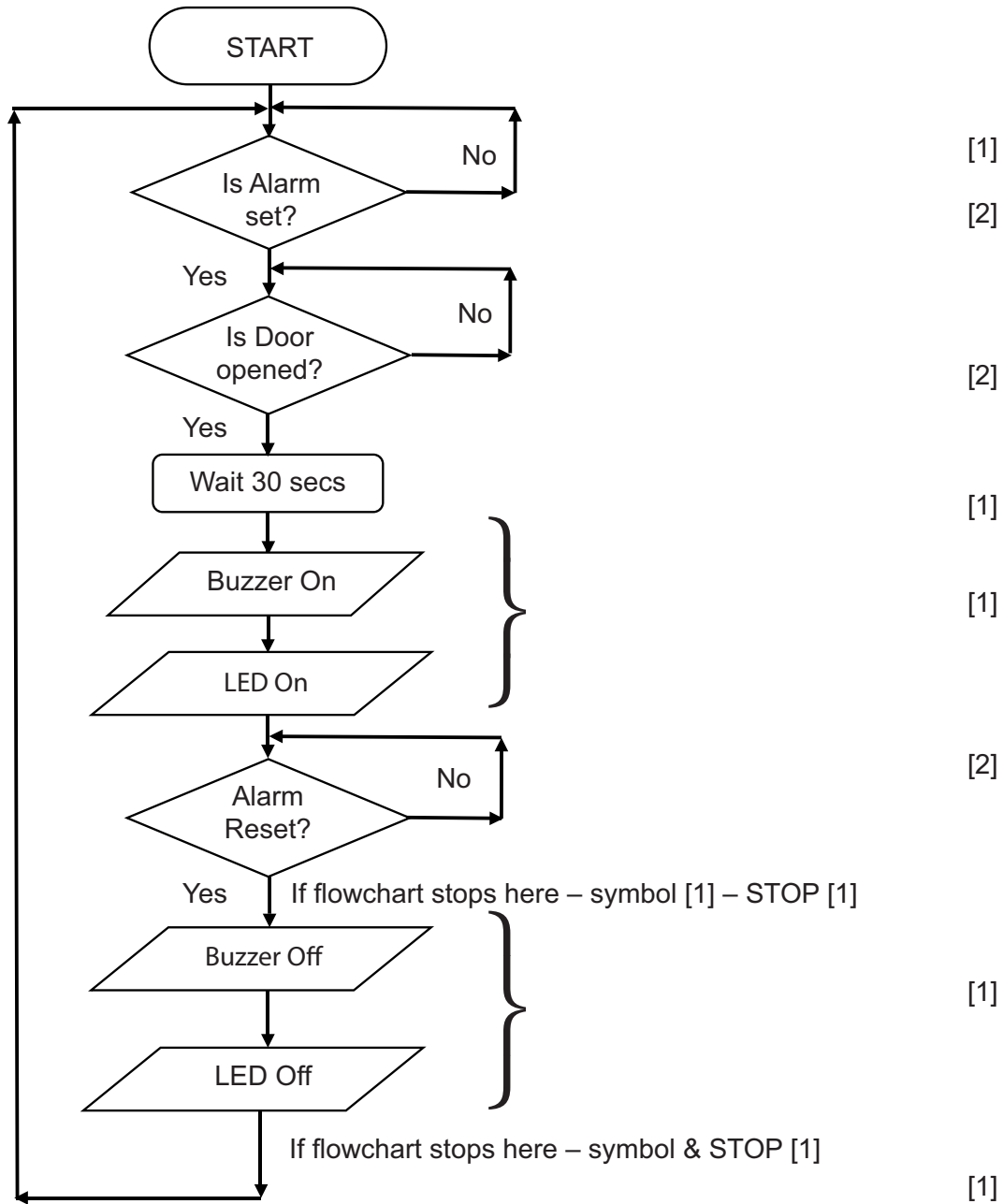


[1] for each correct symbol
 (Correctly connected to produce a functioning circuit/in any position) [3]

(c) (i) LED [1]

(ii) Orange [1] White [1] Brown [1] [3]

12



AVAILABLE MARKS
[1]
[2]
[2]
[1]
[1]
[2]
[1]
[1]
11

All relevant, valid responses will be given credit

- 8 (a) 1 Welding [1]
2 Brazing [1]
3 Soft soldering [1] [3]

- (b) Any **four** from:
Prepare/clean the material/surfaces to be joined.
Apply flux.
Heat the soldering iron.
Clean soldering iron.
Tin the soldering iron.
Apply the soldering iron to the surfaces to be joined.
Apply solder to the soldering iron/joint.
Allow the soldered joint to cool.
(4 x [1]) [4]

All relevant, valid responses will be given credit

- (c) (i) Using nuts and bolts requires a hole to be drilled through the two metals [1] whereas machine screws require one hole and a short threaded hole in the other piece of metal[1] [2]

- (ii) Machine Screws [1]

- Any **one** from:
Machine screws are much neater as they do not leave a nut shown
Machine screws do not require a long hole to be drilled through one part
Machine screws screw directly into the other plate [1]

All relevant, valid responses will be given credit

AVAILABLE
MARKS

11

9 (a) (i)

Pneumatic Component	Letter
Unidirectional Flow Restrictor	C
3/2 Valve Plunger Operated	B
Single Acting Cylinder	D
3/2 Valve Push Button Operated	A

[4]

(ii) Lower Guard [1]
And press Button A [1]

[2]

(iii) Any ONE of:
Increase [1] air pressure [1]
Adjust the Restrictor/[1] by loosening [1] Flow Control Valve
Remove unidirectional flow restrictor [2]
Decrease dia of the piston [2]

[2]

(iv) AND Logic

[1]

(b) (i) Stainless steel

[1]

(ii) Any **two**:
Hygienic
Doesn't Rust/corrode
Easily cleaned
Strong/hard wearing/durable

[2]

AVAILABLE
MARKS

12

10 Indicative Content:

- Use marking blue or felt tip marker.
- Mark out positions of the four holes on brass sheet.
- Mark on brass sheet, using a scribe, centre punch, hammer, odd-leg calipers, rule, engineer square etc. to mark positions on brass sheet.
- Position of centre of holes to be 10 mm in from side and 10 mm down from top.
- Repeat four times.
- Clamp the brass sheet.
- Insert appropriate sized drill bit into a pillar drilling machine.
- Drill the four holes in the correct locations.
- Remove drill bit.
- Insert a countersunk drill bit into the pillar drilling machine.
- Countersink the four holes.
- Remove burr from back of the metal with a file.
- Set brass sheet on mahogany board.
- Ensure a 50 mm border all around the brass sheet.
- Clamp the two materials together.
- Use a bradawl to locate hole to start the first woodscrew.
- Screw the two pieces together.
- Repeat this process on the other three corners ensuring that the border remains at 50 mm.
- Make sure that woodscrews are flush with the surface.

Safety Precautions:

- Be aware of the sharp corners on all metal edges.
- Wear goggles when using the drill machine.
- Hair tied back if required.
- Ensure there is no loose clothing.
- Ensure the drilling machine guard is in position.
- Ensure material is securely clamped.
- Ensure the drill bit is correctly tightened.
- Remove chuck key from chuck before switching on machine.
- Ensure the drilling machine is turned off after use.
- Wash hands after using the machines.

AVAILABLE
MARKS

Response Type	Description	Mark Band
Limited	Students correctly identify very few steps in the manufacturing process and some or no safety precautions. The level of accuracy of spelling, punctuation and grammar is limited in most cases. Form and style are generally inappropriate as is the use of specialist terms.	[1]–[4]
Satisfactory	Students correctly identify some steps in the manufacturing process most of which are in order with some or no safety precautions. The level of accuracy of spelling, punctuation, and grammar is satisfactory in most situations. Form and style are satisfactory in most cases and specialist terms are used appropriately in some cases.	[5]–[7]
Very good	Students correctly identify the majority of the steps in the manufacturing process most of which are in order with a number of safety precautions. The level of accuracy of spelling, punctuation, grammar is very good. Form and style are of a high standard and specialist terms are used appropriately at all times.	[8]–[10]

[10]

Total

AVAILABLE MARKS

10

100