



**General Certificate of Secondary Education**  
**2018**

---

## **Technology and Design**

**Unit 1: Technology and Design Core Content**  
**[GTY11]**

**WEDNESDAY 23 MAY, 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.

Students must:

- recall select and communicate their knowledge and understanding of technology and design in a range of contexts (AO1);
- apply skills, knowledge and understanding, in a variety of contexts and in designing and making products (AO2); and
- analyse and evaluate products, including their design and production (AO3).

### ***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.

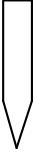
Level 3: Quality of written communication is very good.

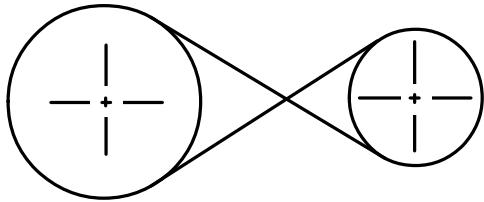
In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

**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.

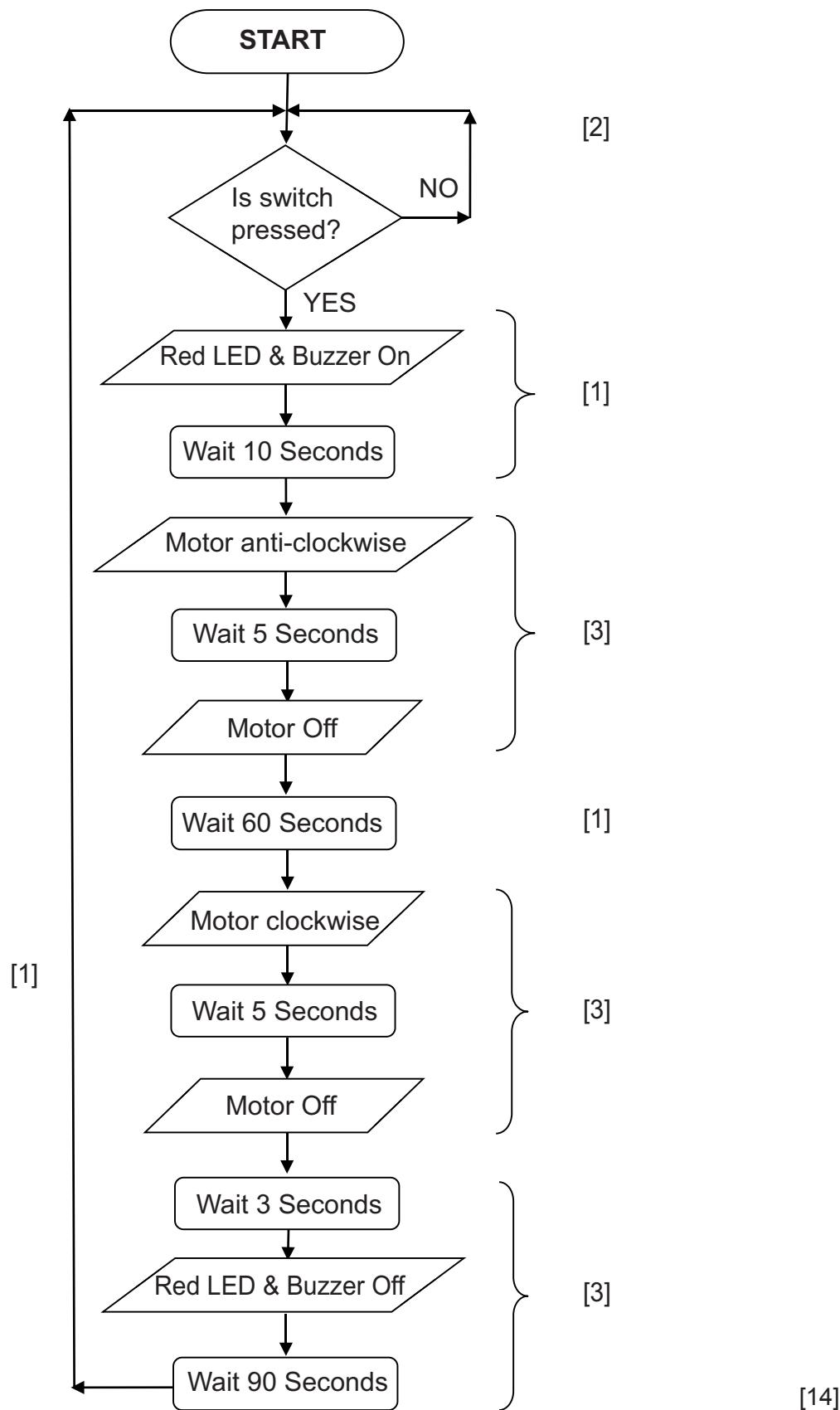
**Level 2 (Satisfactory):** The level of accuracy of presentation, spelling, punctuation and grammar is satisfactory. The candidate makes a satisfactory selection and use of an appropriate form and style of writing supported with appropriate use of diagrams as required. Relevant material is organised 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) Thyristor		[1]	AVAILABLE MARKS
		[1]	
Mechanical Output		[1]	
Pneumatic		[1]	
Push Button		[1]	
(b) Any flowchart symbol from Appendix 3 other than Stop/Start/Output Clear sketch [1] Correct name [1]		[2]	
(c) (i) Process [1]			
(ii) X=Gate, Y=Anode, Z=Cathode [3]		[4]	12
2 (a) Hardwood		[1]	
(b) Any <b>three</b> of the following: Reduces wasting material [1] Checks whether or not the design can be manufactured successfully [1] Allows the design to be altered before manufacture [1] Saves making a model [1] Designs can be examined in detail on the screen [1] The design can be saved on the computer for reuse [1]		[3]	
<b>Correct alternative responses will be considered</b>			
(c)	<pre>     graph TD       A[Upload lid design to computer] --&gt; B[Tape plastic to wood]       B --&gt; C[Clamp the wood to the worktable]       C --&gt; D[Lock guard in position]       D --&gt; E[Turn on CNC machine]       E --&gt; F[Safely remove the material from CNC]   </pre>		

			AVAILABLE MARKS
<b>(d)</b>	Any <b>four</b> of the following: Mark out sides with a pencil, steel rule and try square [1] Mark out the holes using a marking gauge, rule and pencil [1] Clamp the wood in a vice or jig for drilling [1] Insert the appropriate drill bit into the pillar drill [1] Set the depth gauge on the pillar drill [1] Drill the pilot holes [1] Remove wood from vice or jig [1] <b>Correct alternative responses will be considered</b>	[4]	13
<b>3</b>	<b>(a)</b> (i) Clockwise [1]  (ii) Driver Pulley [1]  (iii) High Speed Pulley [1]  (iv) A Vee Belt [1]	[4]	
	<b>(b)</b> Crossed Belt Pulley system		
		[1]	
<b>(c)</b>	Any <b>three</b> of the following advantages of a pulley system: Belts are quiet [1] Belts do not need oiled [1] Belts can be stretched to get them on [1] Belts are less expensive [1] Belts can slip [1] Belts can transmit power over a greater distance [1] <b>Correct alternative responses will be considered</b>	[3]	8
<b>4</b>	<b>(a)</b> B [1] A [1] E [1] G [1]	[4]	
	<b>(b)</b> (i) 3/2 Valve [1]  (ii) Unidirectional flow restrictor [1]	[2]	
<b>(c)</b>	Any <b>two</b> of the following: Always wear Safety Glasses/goggles [1] Turn off Air Supply before building the circuit [1] Do not operate without a Teacher being present [1] Check that all components are securely fastened [1] <b>Correct alternative responses will be considered</b>	[2]	8

5	(a) (i)	<table border="1"> <thead> <tr> <th>Name of Tool</th><th>Letter</th></tr> </thead> <tbody> <tr> <td>Try Square</td><td>C</td></tr> <tr> <td>Countersunk Bit</td><td>D</td></tr> <tr> <td>Centre Punch</td><td>B</td></tr> <tr> <td>Scriber</td><td>E</td></tr> <tr> <td>Forstner Bit</td><td>A</td></tr> </tbody> </table>	Name of Tool	Letter	Try Square	C	Countersunk Bit	D	Centre Punch	B	Scriber	E	Forstner Bit	A	[5]	AVAILABLE MARKS
Name of Tool	Letter															
Try Square	C															
Countersunk Bit	D															
Centre Punch	B															
Scriber	E															
Forstner Bit	A															
(ii)	Any <b>two</b> of the following: To provide a countersunk/tapered hole [1] For use with a countersunk screw [1] To enable a countersunk screw [1] to sit flush with a surface [1]	[2]														
(b) (i)	Any <b>two</b> of the following: Comes in large sheets [1]/doesn't warp [1]/doesn't shrink [1]															
(ii)	Aluminium is a pure metal [1] Aluminium alloy is a mixture of two or more metals [1] <b>Correct alternative response will be considered</b>	[4]	11													
6	(a)	X = Single cell battery [1] Y = Multi cell battery [1]	[2]													
(b) (i)	Symbol A = Light Dependent Resistor (LDR) [1] Symbol B = Transistor [1]	[2]														
(ii)	The switch S is closed [1], Resistance of the LDR increases in darkness [1] Transistor is operated when base receives a signal [1], Buzzer sounds [1]	[4]	8													



		AVAILABLE MARKS
8	<p>(a) Pear Shaped Cam</p> <p>(b) (i) Eccentric Cam [1]</p> <p>(ii) Fulcrum / Pivot [1]</p> <p>(iii) Class 3 Lever [1]</p> <p>(iv) The Material is too light [1] Sticking at Point A [1]</p> <p><b>Correct alternative responses will be considered</b></p> <p>(v) Any <b>two</b> of the following: Add more weight at the front of the boat [1] Lubricate the Pivot [1] Use a Spring [1]</p> <p><b>Correct alternative responses will be considered</b></p>	[1]
		8
9	<p>(a) (i) Push Button [1]</p> <p>(ii) Shuttle Valve [1]</p> <p>(iii) The circuit can be activated from either of two different locations [1] [3]</p> <p>(b) (i) Length of stroke [1] Diameter of SAC [1]</p> <p>(ii) OR Logic [1]</p> <p>(c) By adding a uni-directional flow restrictor to control the speed [1] of the outstroke of the Piston Rod. [1]</p>	[7] [3] [2]
		8
10	<p><b>Indicative Content:</b></p> <ul style="list-style-type: none"> <li>The two pieces of steel to be brazed, are cleaned with emery cloth, or wire brush removing grease and dirt</li> <li>Square off the end of the tube with a file</li> <li>Mark out the plate making use of marking blue, try square, steel rule, scribe, compass</li> <li>Accurately locate the steel tube onto the plate</li> <li>Place the steel pieces on heat resistant bricks on the steel bench or turntable or brazing hearth</li> <li>Reference to brazing equipment for the process</li> <li>A filler rod coated in a flux may be used or flux may be applied to the joint</li> <li>The joint is preheated by holding torch close to the joint</li> <li>Clamps, wire or a jig may be used to hold the two pieces of steel together</li> <li>The flame is focused at one end of the joint, raising the temperature of the steel to a 'red heat'</li> <li>Brazing rod is fed into the joint</li> <li>The molten brazing rod flows into the joint</li> <li>The joint is allowed to cool slowly</li> <li>When cold, a wire brush is used to clean the joint</li> </ul> <p><b>Safety Precautions:</b></p> <ul style="list-style-type: none"> <li>Heat resistant gloves may be used</li> <li>Wear an apron</li> <li>Use clamp to hold material for brazing</li> <li>Wear goggles/eye protection</li> <li>Hair tied back if required</li> <li>Ensure there is no loose clothing</li> <li>Ensure the correct setting on the brazing equipment</li> </ul>	

- Ensure no flammable materials are within the area
- Turn on the air extraction fan
- Ensure the brazing equipment is turned off after use
- Don't pick up the metal until it is cooled
- Wash hands after using brazing

**Correct alternative responses will be considered**

AVAILABLE MARKS

Response Type	Description	Mark Band	
When a response is not worthy of credit, a <b>[0]</b> mark should be awarded			
<b>Limited</b>	Students provide very few steps in the marking out process and limited information on the main features of the brazing processes. Little or no safety precautions referred to throughout the answer. The level of annotation conveys limited information and lacks technical vocabulary and specialist terms. The accuracy of spelling, punctuation and grammar is limited.	<b>[1]–[3]</b>	
<b>Satisfactory</b>	Students provide some of the steps in the marking out process and some information on the main features of the brazing processes most of which are in order. Some safety precautions referred to throughout the answer. The level of annotation is satisfactory and contains some technical vocabulary and specialist terms. The accuracy of spelling, punctuation and grammar is satisfactory.	<b>[4]–[7]</b>	
<b>Very Good</b>	Students correctly provide most of the steps in the marking out process and most information on the main features of the brazing process which are in order. Most safety precautions referred to throughout the answer. The level of annotation and technical vocabulary and specialist terms is generally very good. The accuracy of spelling, punctuation and grammar is very good.	<b>[8]–[10]</b>	
<b>[10]</b>			<b>10</b>
<b>Total marks</b>			<b>100</b>