



**General Certificate of Secondary Education  
2019**

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## **Technology and Design**

**Unit 1: Technology and Design Core**

**[GTY11]**

**FRIDAY 24 MAY, MORNING**

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## **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.

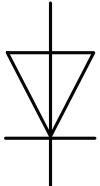
Level 3: Quality of written communication is very good.

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.

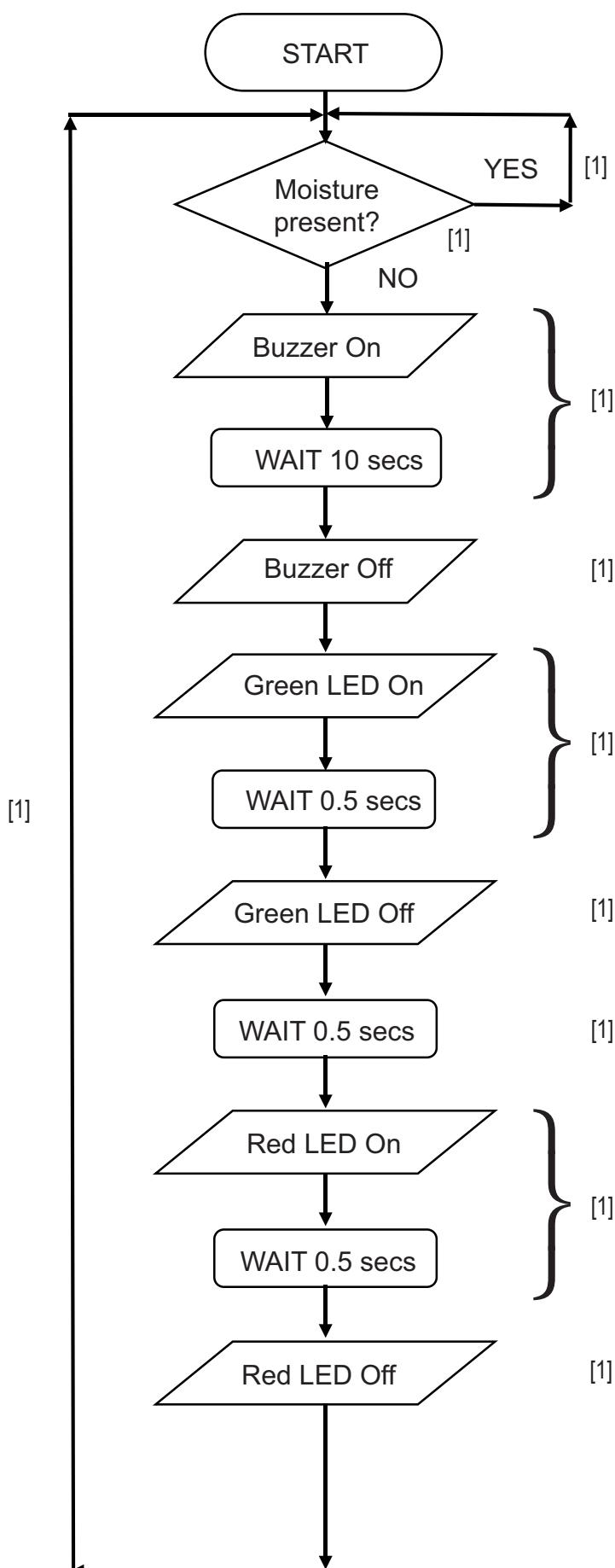
**Level 2 (Satisfactory):** The level of accuracy of presentation, spelling, punctuation and grammar is satisfactory. The candidate makes a satisfactory selection and use of an appropriate form and style of writing supported with appropriate use of diagrams as required. Relevant material is organised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

		AVAILABLE MARKS
1 (a) Mechanical	[1]	
Belt and Pulley/Pulley System	[1]	
Single Pole Single Throw/SPST switch	[1]	
	[1]	
Electronic	[1]	
(b) (i) Light Emitting Diode (LED)	[1]	
Output	[1]	
(ii) Light Dependent Resistor	[1]	
Input	[1]	
(c) Shuttle Valve	[1]	
To allow the circuit to operate from different positions or OR logic [1]		
or		
To allow the circuit to operate from two [1] different positions	[2]	12

		AVAILABLE MARKS
2	(a) (i) Zinc [1] Copper [1]	[2]
	(ii) Any <b>two</b> from: Electrical conductivity Thermal conductivity Machinability Colour Corrosion resistant Ductile (2 × [1])	[2]
	<b>Correct alternative responses will be considered</b>	
(b)	Any <b>two</b> from: Quick to edit the drawings Range of tools and symbols Reduces manufacturing times Reuse existing designs and drawings Can convert 2D to 3D drawings quickly Drawings can be printed directly from the computer (2 × [1])	[2]
	<b>Correct alternative responses will be considered</b>	
(c)	Any <b>two</b> from: Producing the various diameters of the component/parallel turning Knurling Create a chamfer/bevel/taper turning Face off the ends of the component Create a screw thread/threading/screw cutting (2 × [1])	[2]
	<b>Correct alternative responses will be considered</b>	
(d)	<p>Insert and tighten workpiece into the chuck</p> <p>Set the spindle speed [1]</p> <p>Carry out all safety checks [1]</p> <p>Align cutting tool and begin cutting [1]</p> <p>Clean the lathe after completion [1]</p>	[4]
		12

		AVAILABLE MARKS
3	(a) (i) Rotary [1] (ii) Reciprocating [1]	
	(b) (i) Pear Shaped [1] (ii) Downward [1]	
	(iii) 60 mm – 20 mm [1] = 40 mm [1] [2]	6
4	(a) 3 Port Valve [1]	
	(b) (i) Mains Air Supply labelled [1] Exhaust labelled [1] [2]	
	(ii) Push Button [1] Spring Return [1]	
	(c) 3PV A Push Button is pressed [1] SAC B Extends and hits roller on 3PV C [1] 3PV C activates [1] SAC D Extends [1] Both SAC's Return when A is released [1] [5]	10
5	(a) (i) Thermoplastic [1] (ii) Hardwood [1] (iii) Ferrous [1] (iv) Mild steel [1] (v) Manufactured board [1]	
	(b) Thermoplastic [1] Because it will soften when heated [1] and solidify when cool/or take up the shape of the mould or former [1] [2]	
	(c) Odd-leg calliper [1] Scribe a line along a metal bar or sheet [1] Scribe a line parallel to the edge of a metal bar or sheet [2] [2]	11
6	(a) (i) Printed Circuit Board [1] (ii) Etching or CNC milling [1] Drilling [1] [2]	
	(iii) To construct copper tracks for the base circuit [1] To produce holes to locate the electronic components across the copper tracks [1] [2]	
	(b) (i) X = Thermistor [1] Y = Potentiometer [1] [2]	
	(ii) Soldering [1] [1]	8

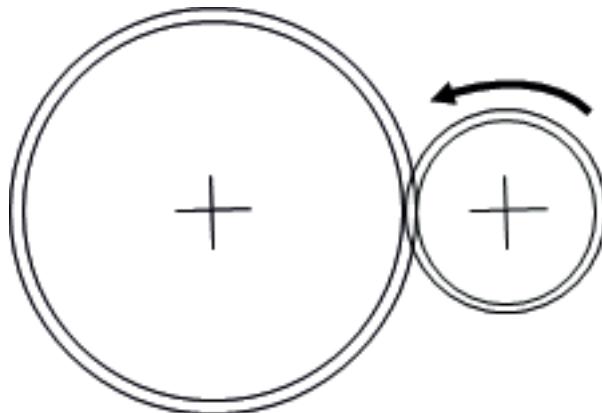


[10]

10

Correct alternative responses will be considered

		AVAILABLE MARKS
8	(a) Sprocket and Chain [1] Belt and Pulley [1]	[2]
(b) (i) Driven gear	[1]	
(ii) Correct direction		



[1]

$$(iii) GR = \frac{\text{No. of teeth on the driven gear}}{\text{No. of teeth on the driver gear}}$$

$$= \frac{25}{75} [1]$$

$$= 1:3 [1]$$

[2]

(c) (i) Any <b>two</b> from:	
Decrease gear ratio	
Decrease the speed of the motor	
Change the lorry wheels to a larger size	[2]
<b>Correct alternative responses will be considered</b>	
(ii) Use an idler gear between the two gear <b>or</b> Insert two additional gears	[1]
<b>Correct alternative responses will be considered</b>	
(iii) The lorry will move in the opposite direction <b>or</b> No change if two additional gears are used	[1]
<b>Correct alternative responses will be considered</b>	10

		AVAILABLE MARKS
9	(a) (i) A – Lever [1] B – Plunger [1]	[2]
	(ii) A – To switch on by hand [1] To switch off by hand [1]	[2]
(b) (i)	Press <b>A</b> AND <b>B</b> together/at the same time [1] The Pressure/Air is slowed down by the component <b>C</b> [1] The Single Acting Cylinder Extends slowly and prints on the box [1] When you release either <b>A</b> or <b>B</b> or both the SAC Returns quickly [1]	[4]
(ii)	Any <b>three</b> from: Wear goggles Switch off Mains air when building the circuit Watch your hands/Beware of moving parts Don't blow compressed air at anyone Check all connections before turning on the air <b>Correct alternative responses will be considered</b>	[3]
		11

#### 10 Indicative Content:

- Mark out the position for the four holes
- Each hole to be centrally located, 10 mm in from one edge of the aluminium frame/acrylic sheet and 100 mm down from the other edge
- Using a steel rule, pencil, permanent marker, try square, scriber
- Use hammer and centre punch to locate hole on aluminium frame
- Clamp the two pieces of material together and drill through both
- Using a clamp and vertical drilling machine
- Drill holes using a 6 mm drill bit or slightly larger to provide a clearance hole
- Remove burrs on each material caused by drilling
- Insert a pop rivet into pop rivet gun/pliers
- Locate pop rivet in hole and apply pressure to gun/pliers to pull the pin through the rivet
- This deforms the rivet slightly so that it joins the plastic and aluminium
- The pin of the rivet will break off leaving the head inside the rivet
- Repeat this process for the other three rivets

#### Safety Precautions:

- Ensure clamps are fully tightened for drilling
- Ensure drill is tightened in chuck
- Drill the hole steadily without making the material jump
- Wear goggles when using drilling machine and rivet gun
- Wear your hair tied back
- Ensure there is no loose clothing
- Ensure the machine guard is in position
- Ensure the drilling machine is turned off after use
- Be aware of the pin shooting out

**Correct alternative responses will be considered**

Response Type	Description	Mark Band	AVAILABLE MARKS
<b>Limited</b>	Students correctly identify very few stages in the marking out and pop riveting process, with some or no safety precautions. The level of accuracy of spelling, punctuation and grammar is limited in most cases. Form and style is generally inappropriate as is the use of specialist terms.	[1]–[4]	
<b>Satisfactory</b>	Students correctly identify some stages in the marking out and pop riveting 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 is satisfactory in most cases and specialist terms are used appropriately in some cases.	[5]–[7]	
<b>Very good</b>	Students correctly identify the majority of steps in the marking out and pop riveting process, most of which are in order with a number of safety precautions. The level of accuracy of spelling, punctuation and grammar is very good. The form and style is of a high standard and specialist terms are used appropriately at all times.	[8]–[10]	
		[10]	10
<b>Total</b>			<b>100</b>