



General Certificate of Secondary Education  
2016

---

## Technology and Design

Unit 1: Technology and Design Core

[GTD11]

TUESDAY 24 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.


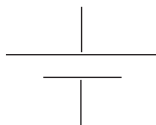
Level 3: Quality of written communication is very good.


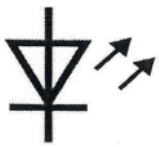
In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

**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.

				AVAILABLE MARKS
1		[1]		
	Electronic	[1]		
	Belt & Pulley	[1]		
	Mechanical	[1]		
	Eccentric Cam	[1]		
	Mandatory Sign	[1]		
		[1]		
	Electronic	[1]		
	Pneumatic	[1]	[9]	9
2	(a)	<ul style="list-style-type: none"><li>Creates a drawing for a CNC machine</li><li>Creates a computer file</li><li>Products can be designed and modified quickly</li><li>Allows for testing of prototypes during the design process</li><li>No need to make the prototype</li></ul> <p>All alternative responses will be considered.</p> <p>Any <b>two</b></p> <p>(2 × [1])</p>	[2]	
	(b)	<ul style="list-style-type: none"><li>Lathe</li><li>Milling machine</li><li>Laser Cutter</li><li>3D printer</li><li>Vinyl cutter</li><li>Router</li></ul> <p>Any <b>three</b></p> <p>(3 × [1])</p>	[3]	
	(c)	<ul style="list-style-type: none"><li>Faster than by human control/hand</li><li>Easily created</li><li>Production can be 24 hours a day</li><li>Reduces final costs/price</li><li>Fully integrated CAD/CNC process</li><li>Reproducible</li></ul> <p>All alternative responses will be considered.</p> <p>Any <b>one</b></p>	[1]	6
	(i)	Rotary	[1]	
		Linear	[1]	
	(ii)	Anti clockwise	[1]	
	(iii)	Wheel B      60 rev/min	[1]	
		Speed drum = reference to ratio	[1]	
		= 90 rev/min	[1]	
	(iv)	Belt and pulleys or Chain and sprockets	[1]	
				7

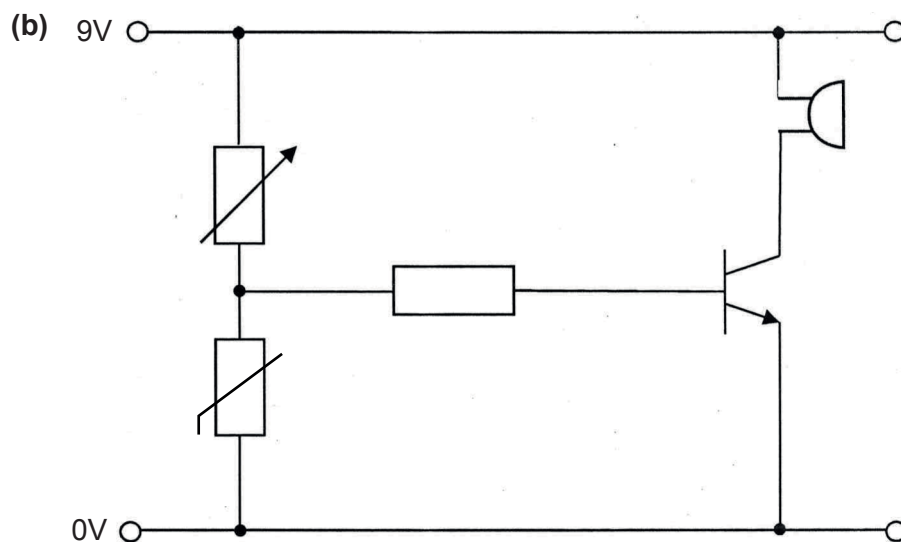
		AVAILABLE MARKS
<p>4 (a) (i) A plastic which softens on heating/can be reshaped [1]</p> <p>(ii) Vacuum forming</p> <p>Line bending/Strip bending</p> <p>Shape by wasting</p> <p>Oven and former</p> <p>Any <b>two</b></p> <p>(2 × [1]) [2]</p>		
<p>(b) (i) Acrylic/Rigid polystyrene [1]</p> <p>(ii) For accuracy [1]</p> <p>For holding as stand cools [1]</p> <p>Can be used again (Any <b>two</b>)</p>		6
<p>5 (a) Current: Amps</p> <p>Voltage: Volts</p> <p>Resistance: Ohms</p> <p>(3 × [1]) [3]</p>		
<p>(b)</p>  <p>Resistor [1]</p>		
 <p>Light emitting diode [2]</p>		
<p>(c) Band 1 colour: Orange [1]</p> <p>Band 2 colour: Orange [1]</p> <p>Band 3 colour: Red [1]</p>		9

6	(i)	A 3 port valve	[1]	<div>AVAILABLE MARKS</div> <div></div>
		B shuttle valve	[1]	
		C one way flow restrictor or flow regulator	[1]	
	(ii)	Ensure all connections are tightened		
		All components are secured		
		Correct air pressure		
		All alternative responses will be considered. (Any <b>one</b> )	[1]	
	(iii)	A Provides compressed air when button pressed	[1]	
		B Allows air to be supplied from A OR D	[1]	
		C Controls the speed of outstroke of cylinder E	[1]	
		D Provides compressed air when button pressed	[1]	
		E Provides force to remove parcel	[1]	9
		All alternative responses will be considered.		
7	(a)	The hole is to allow access for a tool or machine to cut out the centre	[2]	
	(b)	(i) Centre punch/Dot punch		
		(ii) Hammer (2 × [1])	[2]	
	(c)	Form around a metal/hardwood jig of suitable thickness/depth; Clamp and bend using a vice and jig; Metal folding bars.	[2]	
				6

8 (a)

Letter	Name of Electronic Component
A	Transistor
B	LDR
C	Buzzer
D	Thermistor

[4]

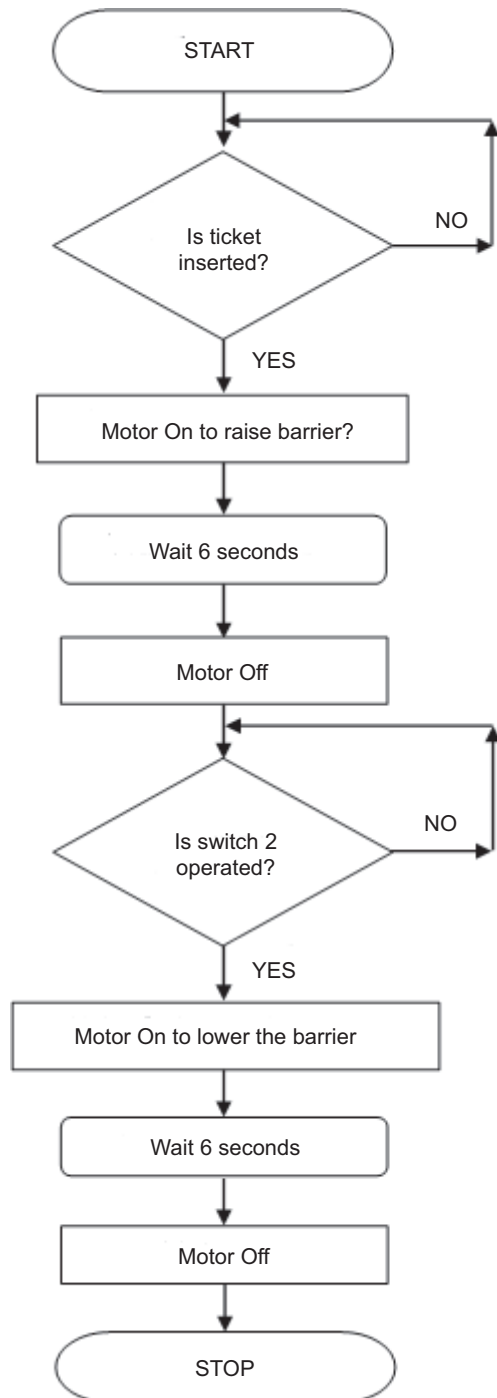


Each symbol correctly drawn and correctly located (3 × [2])

[6]

10

9

 $(9 \times [1])$ AVAILABLE  
MARKS

9



10	(i)	Blade material:	Mild steel or steel or High carbon steel	[1]	AVAILABLE MARKS
		Reason:	Strength or durability	[1]	
		Handle material:	Beech or Mahogany	[1]	
		Reason:	Durable or easily shaped	[1]	
		All alternative responses will be considered.			
	(ii)	Lever			[1]
	(iii)	Improved reach or less force required			[2]
	(iv)	To prevent hands clashing when blades close			[2]
					9

**11 Indicative Content:**

- Square off the two ends of the wood;
- Mark out holes using a pencil, rule or a jig, etc.;
- Prepare and select the dowels, i.e. select size, cut to length (if required);
- Mark out one end of one of the pieces of wood to prepare for the dowels;
- Set the depth for drilling the holes;
- Clamp the wood and drill the two holes to the correct alignment;
- Repeat the 3 steps above for the second piece of wood;
- Apply wood glue to the two dowels and insert them into the first piece of wood;
- Apply wood glue to the two holes in the other piece of wood;
- Carefully line up the two pieces of wood and tap the end with a mallet;
- Use a clamp to hold and secure the joint and leave time for the wood glue to set;
- Wipe off excess wood glue;
- Finish with plane, sander, etc. when wood glue has hardened.

**Safety Precautions:**

- Use vice to hold material for marking out;
- Watch out for the points on the metal dowel inserts (if used);
- Wear goggles when using the drill machine;
- Wear your hair tied back;
- Ensure there is no loose clothing;
- Ensure the drilling machine guard is in position;
- Ensure clamps are fully tightened for drilling;
- Ensure the drilling machine is turned off after use;
- Wash hands after using the wood glue.

[10]

Response Type	Description	Mark Band
<b>Limited</b>	Students correctly identify very few steps in the dowel joint 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 is generally inappropriate as is the use of specialist terms.	<b>[1]–[4]</b>
<b>Satisfactory</b>	Students correctly identify some steps in the dowel joint 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. The form and style is satisfactory in most cases and specialist terms are used appropriately in some cases.	<b>[5]–[7]</b>
<b>Very good</b>	Students correctly identify the majority of steps in the dowel joint 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. The form and style is of a high standard and specialist terms are used appropriately at all times.	<b>[8]–[10]</b>

AVAILABLE  
MARKS

10

**Total****90**