Rewarding Learning

General Certificate of Secondary Education
2014

Technology and Design

Unit 1: Technology and Design Core

[GTD11]

FRIDAY 23 MAY, AFTERNOON

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 reaqsonably 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:

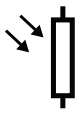
Level 1: Quality of written communication is limited.
Level 2: Quality of written communication is satisfactory.
Level 3: Quality of written communication is very good.

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

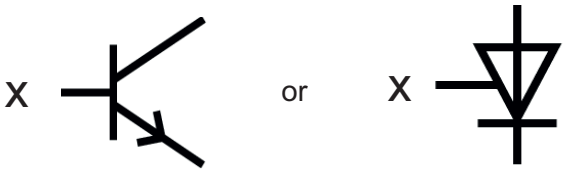
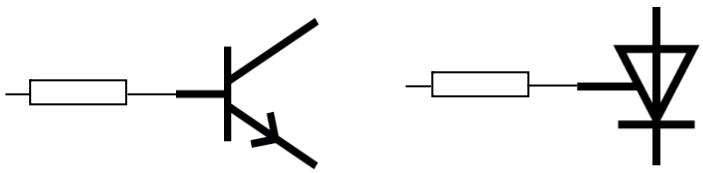
Level 1 (Limited): The level of accuracy of presentation, spelling, punctuation and grammar is limited. The candidate makes a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary.

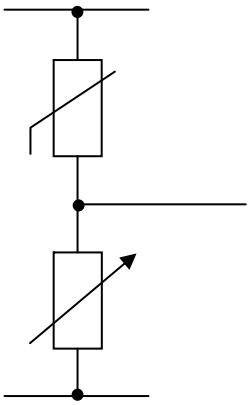
Level 2 (Satisfactory): The level of accuracy of presentation, spelling, punctuation and grammar is satisfactory. The candidate makes a satisfactory selection and use of an appropriate form and style of writing supported with appropriate use of diagrams as required. Relevant material is organised with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

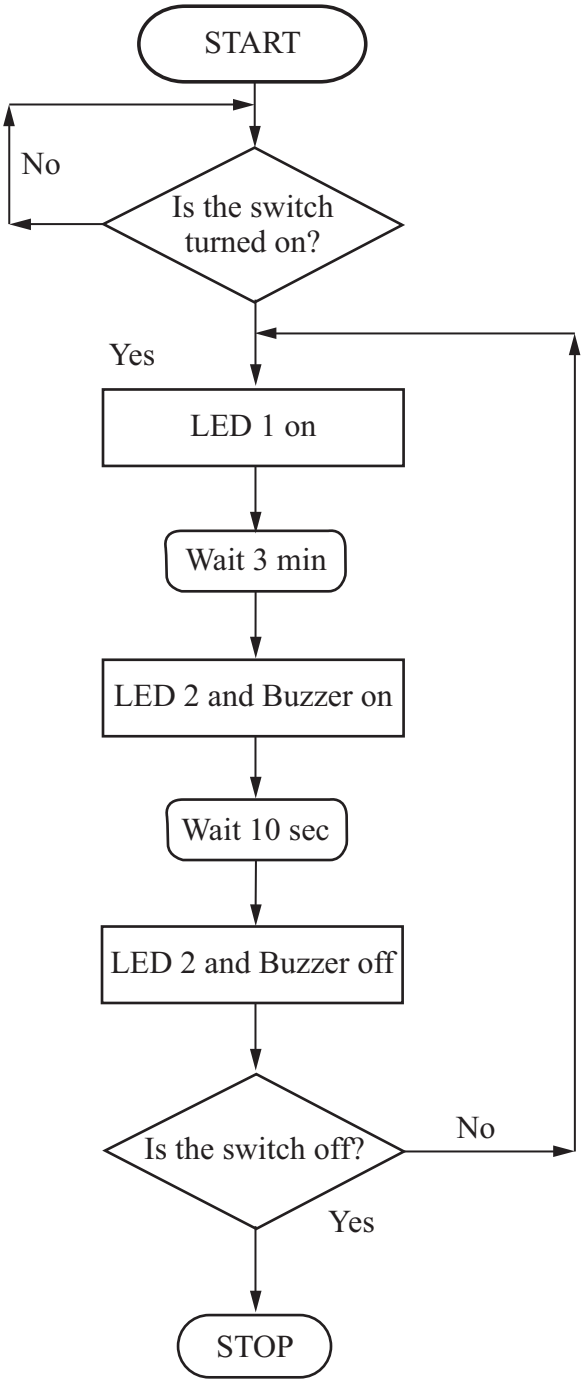
			AVAILABLE MARKS
1	Variable Resistor  Gear or Gear Wheel Electronic Push to Make Switch Flammable Light Dependent Resistor  Electronic Pneumatic Shuttle Valve (9 × [1])	[9]	9
2	**(a)** **(i)** A file is generated by using Computer Aided Drawing (CAD)	[1]	
	(ii) Computer Numerical Control (CNC) is used to manufacture the product, e.g. milling; laser cutter etc.	[1]	
	(b) **Advantage** Fast process; saves on material; good for repeat operations; accurate; quick transfer of drawings to CNC; (any one)	[1]	
	Disadvantage Expensive set-up costs; requires knowledge of specific software. (any one)	[1]	4
3	**(i)** Vee belt	[1]	
	(ii) Rotary motion	[1]	
	(iii) Gear train/sprocket and chain	[1]	
	(iv) Anti-clockwise arrow	[1]	
	(v) Use a smaller motor pulley or a larger machine pulley	[2]	6
4	**(i)** Thermoplastic: Can be reshaped by heating. Thermosetting: Once moulded remains rigid and cannot be reshaped by heating.	[2]	
	(ii)	[4]	
	(iii) Melamine	[1]	
	Hard wearing, stain resistant, scratch resistant, heat resistant thermosetting plastic, etc. (any **one**)	[1]	8

Material	Thermosetting	Thermoplastic
Acrylic		✓
Melamine	✓	
Polyester resin	✓	
Rigid polystrene		✓

					AVAILABLE MARKS
5	(a)	(i)	Transistor Thyristor	[2]	
		(ii)	 **(a)** **(b)**	[1]	
		(iii)	**(a)** = Base or **(a)** = Gate	[1]	
		(iv)	0.6 V–0.8 V	[1]	
	(b)	(i)	Component **A** Transistor: When an input voltage is received the transistor switches on. It switches off when it receives a low or no voltage.	[2]	
			Component **B** Thyristor: When an input voltage is received the thyristor switches on. It latches, or remains on, even if the gate voltage is removed, or it cannot turn off unless the power is turned off or thyristor reset.	[2]	
		(ii)		[2]	11
6	(a)	(i)	3 port valve	[1]	
		(ii)	One way flow restrictor or flow regulator	[1]	
		(iii)	Single Acting Cylinder (SAC)	[1]	
	(b)	(i)	AND	[1]	
		(ii)	Safety or as an interlock	[1]	
		(iii)	Method 1: press buttons A and B	[1]	
			Method 2: press D	[1]	
		(iv)	To enable an OR connection **or** to prevent air escaping from the unoperated valve	[2]	9

		AVAILABLE MARKS
7 **(a)** Mould **A** has tapered sides [1]		
(b) **(i)** Medium Density Fibreboard [1]		
(ii) Easier to shape and work with; no knots; easy to machine; no surface grain; MDF has no grain, it can be cut, drilled, machined and filed without damaging the surface; smooth finish (any **one**) [1]		
(c) Radius to top edge of the mould Polish the mould Smooth the sides with sandpaper Increase the taper Release agent Fixing to base, e.g. handle (any **two**) [2]		5
8 **(a)** Soldering Iron, Solder, de-soldering tool, Pliers, PCB Drill, Wire, Wire Cutters/Strippers. Any **three** suitable answers [3]		
(b) Battery, SPST Switch, Variable Resistor, Thermistor, Resistor, Transistor. [6]		
(c)  Assuming, NTC [2]		11

9



(10 × [1]) [10] 10

10 **(a)** Pressure required
Cylinder diameter
Hand or foot operation
or other acceptable answer
any **two** appropriate points (2 × [1]) [2]

(b) **(i)** Class 2 [1]

(ii) Lever material : steel [1]
Reason : strength [1]

(c) A smaller effort is required [1]

A greater distance is moved [1] 7

AVAILABLE MARKS

		AVAILABLE MARKS
11	**Indicative Content:** • Cut to shape with scroll saw or coping saw/Hegner saw • Hold plastic in a vice with plastic grips • Cross file and shape plastic • Draw file the plastic • Use emery or wet and dry paper • Use hand clamp or pliers to hold the acrylic • Hold the acrylic at the correct position on the polishing wheel • Use the polish wheel of the polishing machine • Use the buffer on the polishing machine • Repeat process if necessary • Drilling and related procedures **Safety Precautions:** • Make sure the area is safe • Make sure the file handles are secure • Wear goggles when using power tools/machines • Wear hair tied back • Ensure there is no loose clothing • Ask teacher permission and work under supervision when using power tools • Ensure the guard is in place • Keep hands away from a polishing wheel • One person operating a machine • Never leave the machine unattended • Ensure the clamp is fully tightened • Switch off a machine when finished • Never use the machine unless fully instructed in its use by the teacher • Hold the acrylic at the correct position on the polishing wheel [10]	

Response Type	Description	Mark Band
Limited	Students correctly identify very few steps in the filing and polishing 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 filing and polishing 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 are satisfactory in most cases and specialist terms are used appropriately in some cases.	**[5]–[7]**
Very good	Students correctly identify the majority of steps in the filing and polishing process and in order with some or a number of safety precautions. The level of accuracy of spelling, punctuation, grammar is very good. The form and style are of a high standard and specialist terms are used appropriately at all times.	**[8]–[10]**

When a response is not worthy of credit then a **[0]** should be awarded.

10

Total **90**