Rewarding Learning

General Certificate of Secondary Education
2018

Technology and Design

Unit 1: Technology and Design Core

[GTD11]

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:

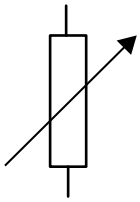
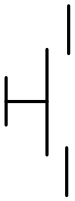
Level 1: Quality of written communication is limited.
Level 2: Quality of written communication is satisfactory.
Level 3: Quality of written communication is very good.

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

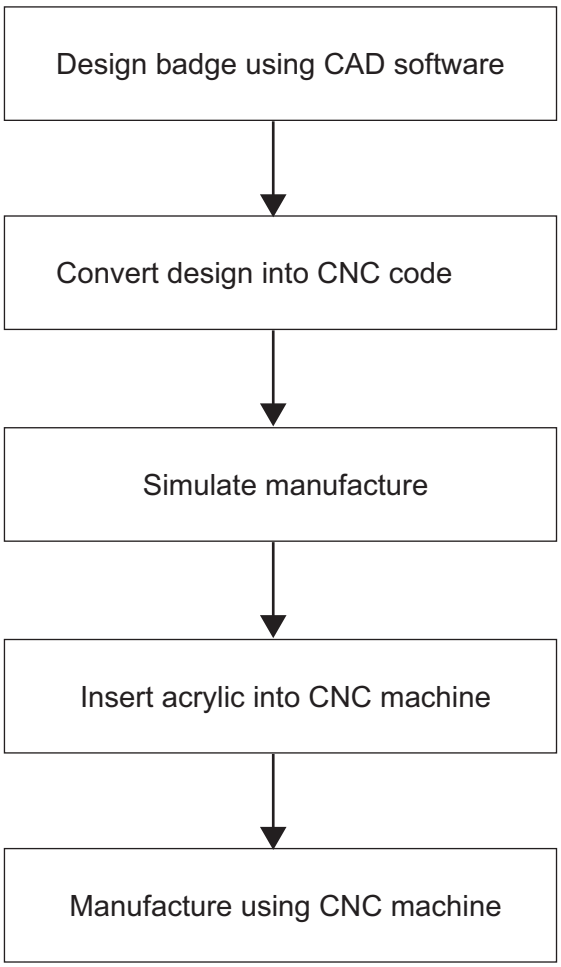
Level 1 (Limited): The level of accuracy of presentation, spelling, punctuation and grammar is limited. The candidate makes a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary.

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.

		AVAILABLE MARKS
1		
	[1]	
Electronic	[1]	
Mechanical	[1]	
Single pulley	[1]	
		
	[1]	
Safe condition sign	[1]	
Location of Emergency stop button	[1]	
Pneumatic	[1]	
Flowchart	[1]	9

2



(4 × [1]) [4] 4

AVAILABLE MARKS

3 **(a)** Rotary [1]

(b) **(i)** Belt 1: Vee belt
Belt 2: Round belt
(2 × [1]) [2]

(ii) Vee belt [1]

(c) By adding an extra gear between existing gears [1]

(d) **(i)** Belt system [1]

(ii) Gear system [1] 7

4

Application / Surface finish	External Mahogany door	Mild Steel rubbish bin	Softwood fence	Plastic sheet
Galvanising		✓		
Varnishing	✓			
Polishing				✓
Preservative Staining			✓	

(a) (4 × [1]) [4]

(b) Any **two** from:
Enhances its appearance
Protects against corrosion
Easy to clean
Range of colours

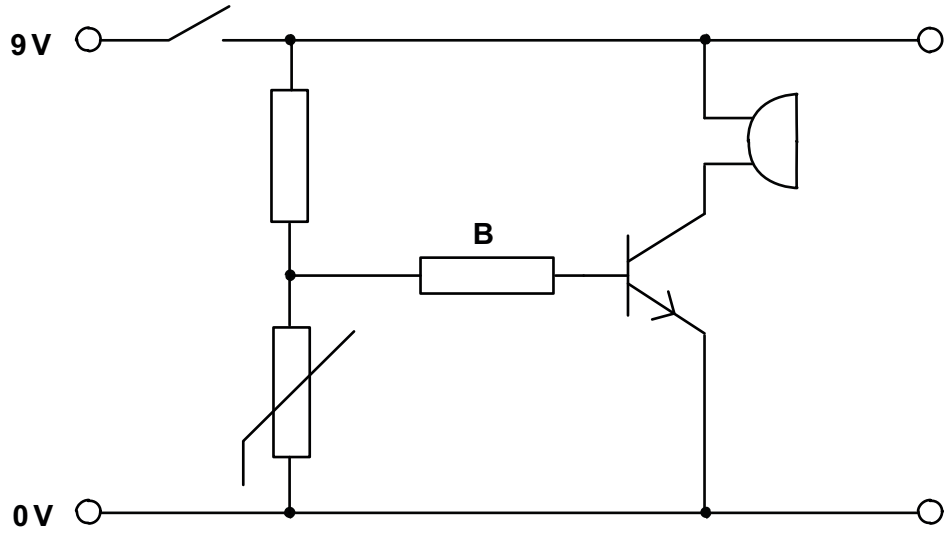
Other appropriate answers will be considered
(2 × [1]) [2] 6

AVAILABLE MARKS

5 **(i)** Symbol **(a)**: Transistor [1]
Symbol **(b)**: Buzzer [1]
Symbol **(c)**: Thermistor [1]

(ii) Component **A**: Single pole single throw switch/SPST switch [1]
Component **B**: Resistor [1]

(iii) Each component correctly inserted as shown below.



[3]

(iv) Symbol **(a)**: Acts as a switch [1] when a voltage of ⩾ 0.7V is received at base [1] [2]
Symbol **(b)**: When circuit is on it makes a buzzing sound [1]
Symbol **(c)**: Reacts to temperature change or Resistance changes with temperature or Resistance decreases with increase in temperature [1] to enable transistor to operate [1] [2] 13

6 **(a)**

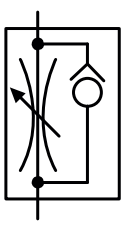
Exhaust
Lever
Pressure source/Air supply

(3 × [1]) [3]

(b) **(i)** Method 1 Press A AND B
Method 2 Press C AND D
(2 × [1]) [2]

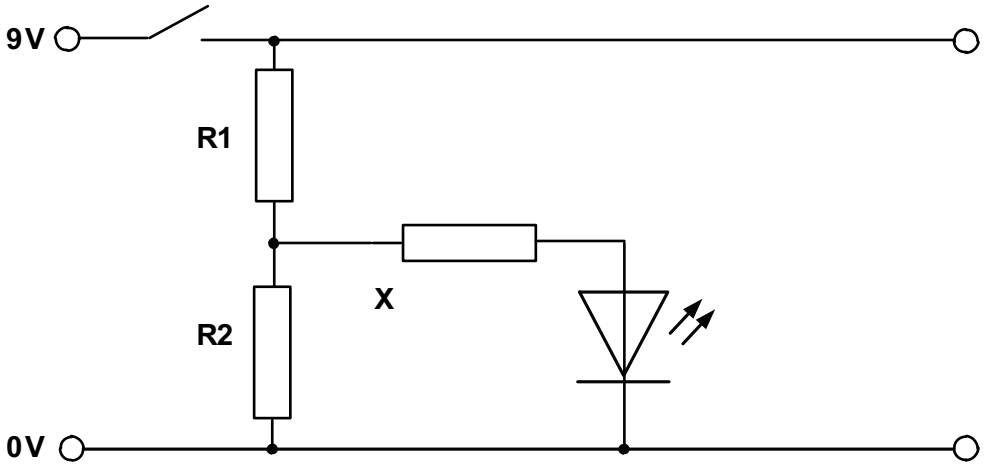
(ii) One way flow restrictor or flow regulator or unidirectional flow restrictor [1]

(iii) Valve fitted in outlet from shuttle valve, restricting the flow into the cylinders [1] 7

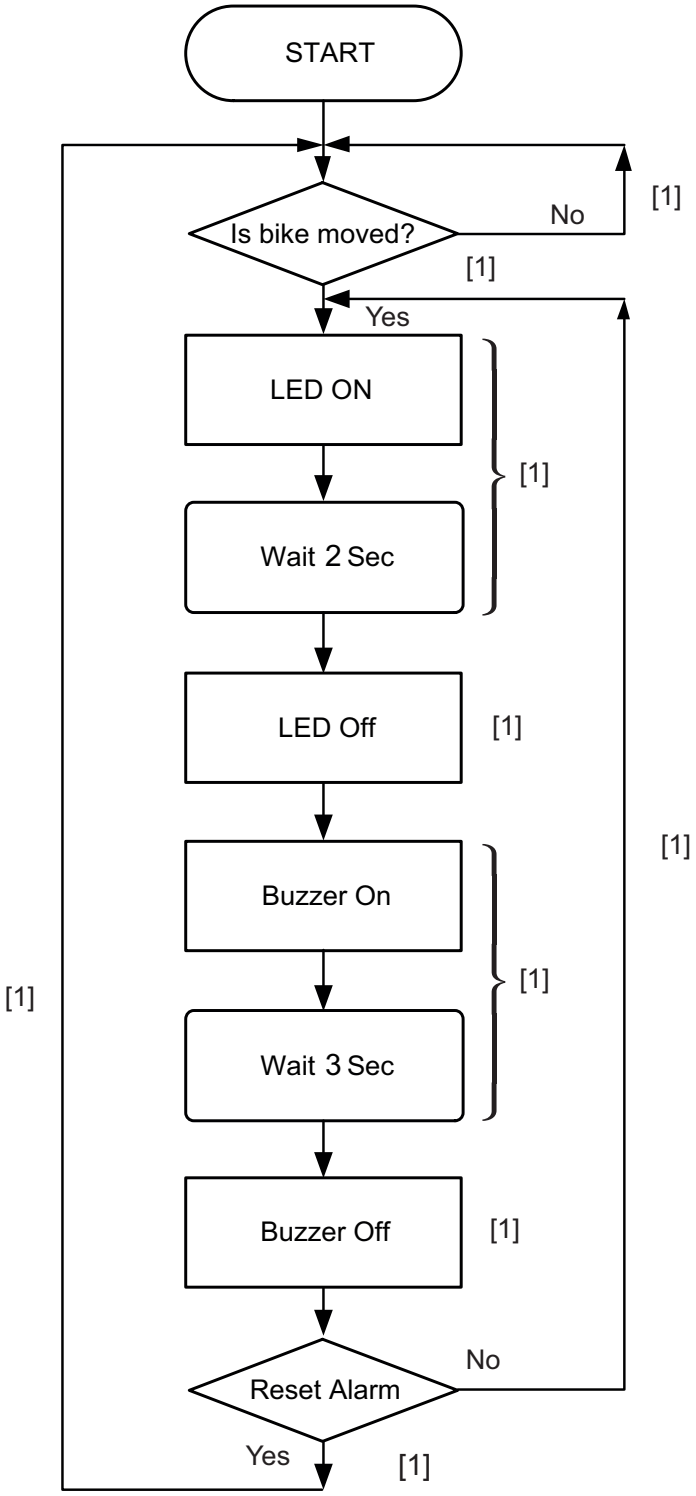


					AVAILABLE MARKS
7	(a)	(i)	Medium Density Fibreboard (1 × [1])	[1]	
		(ii)	Advantages: Any **two** from the list below: Obtained in bigger surface area No grain/no splitting Easier to machine **Other appropriate answers will be considered** (2 × [1])	[2]	
	(b)		Non-toxic paint **Other appropriate answers will be considered** (1 × [1])	[1]	
	(c)		Use of round or countersunk wood screws **Other appropriate answers will be considered** (1 × [1])	[1]	
	(d)	(i)	Cam and follower mechanism (1 × [1])	[1]	
		(ii)	**A** = flat follower **B** = Pear shaped cam (2 × [1])	[2]	8

		AVAILABLE MARKS
8 **(a)**	If first no is 4 [1] If second no is 7 [1] If answered expressed as 47Ω [1] [3]	
(b) **(i)**	4.5V [1]	
(ii)	Increased. Change the value of R1 and/or change the value of R2 [1] Reduce the value of R1 and/or increase the value of R2 [2] [2]	
(iii)	Circuit diagram LED and protective resistor inserted between point **X** and 0V rail Correct symbol for LED [1] Correct orientation of LED [1] Protective resistor included [1] Correct connections [1] [4]	10



9



(9 × [1])

[9]

AVAILABLE MARKS

9

		AVAILABLE MARKS
10 **(a)** **(i)** A mixture of two or more metals or a metal and a non metal [1]		
(ii) Lightweight Does not rust Easily shaped Good strength to weight ratio [2] **Other appropriate answers will be considered** 2 off (2 × [1])		
(b) Foot Pads: To prevent slipping or prevent damage to floor. [1] Extension: To grasp for steadying while working [1]		
(c) Any **two** from: Height to reach ceilings Folding for storage Stability Step spacing for easy climbing/Distance between steps **Other appropriate answers will be considered** 2 off (2 × [1]) [2]		7

11 **Indicative Content:**

- Use felt tip marker for marking out
- Mark out four sides and base using steel rule, engineer (or try) square
- Cut out the sides and base to the correct sizes using a scroll saw or a coping saw
  or
- Draw in CAD
- Download onto CNC laser cutter and cut out shapes
- Clamp the plastic in a vice, file and use emery paper to smooth the ends
- Check the ends are square and straight with an engineer (try) square
- Make a jig or mould and or electrical tape for the corners of the box
- Remove some of the protective layer on the plastic near the edges
- Clamp or tape the acrylic pieces into position
- Wait for three to five minutes until the Acrylic/Tensol Cement has begun to cure
- Use an applicator, syringe or droplet (or other device) to apply the Acrylic/Tensol cement or acrylic solvent to join the corners of the sides of the box
- Gently squeeze the Acrylic/Tensol Cement onto the joint where the two meet being careful to keep the applicator in the joint and against the acrylic. Apply a thin bead along the joint.
- Check that the corners are 90 degree with an engineer's (or try) square
  Allow each corner to solidify before making the next corner
- Repeat this process.
- Let your acrylic box cure for 24 hours before removing the clamps/tape and before using it.

Safety Precautions:

- Safety gloves when using the glue
- Use the acrylic solvent in a well ventilated area
- Watch out for the sharp corners on the plastic edges
- Wear goggles
- Hair tied back if required
- Keep the work area tidy
- Ensure the file(s) handles are fully tightened
- Be aware of the handle and operation of a vice

- Ensure the applicator is safely put away
- Ensure the scroll saw is turned off after use
- Wash hands after the process [10]

AVAILABLE MARKS

10

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 is 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. The form and style is 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 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.	**[8]–[10]**

Total **90**