

FORM 1

DESIGN AND TECHNOLOGY

TIME: 2 hrs

Name: _____

Class: _____

----- **Note to student:** -----

You are required to answer all questions

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DISTRIBUTION OF MARKS

	Marks for Written Exam.	Marks for Design Folio	Marks for Making Skills	TOTAL	FINAL MARK
Max. Marks	100	50	50	200	%
Student's mark					

1. Fill in the missing stages of the design process by using the following words.

- Design brief ▪ Testing and Evaluation ▪ Initial ideas
- Planning ▪ Specifications ▪ Development

- | | |
|--------------|----------------|
| 1. Situation | 6. Chosen Idea |
| 2. _____ | 7. _____ |
| 3. Research | 8. _____ |
| 4. _____ | 9. Making |
| 5. _____ | 10. _____ |

$\frac{1}{2}$ mark \times 6 = 3 marks

2. Carefully read the statement below and then answer questions a to e.

Design and make an electronic air-freshener aimed for 13 year old children to be used also as an accessory to decorate the room.

a. What is this statement called? _____
1 mark

b. Underline THREE keywords in this statement.
1 mark \times 3 = 3 marks

c. List TWO specifications that should be considered when designing for this statement.

1 mark \times 2 = 2 marks

d. Figure A shows an idea for the shape of the casing of the air freshener. The major dimensions for this floral shape are 120mm \times 120mm, whereas the central hole has a diameter of 70mm. Label these dimensions on Figure A.

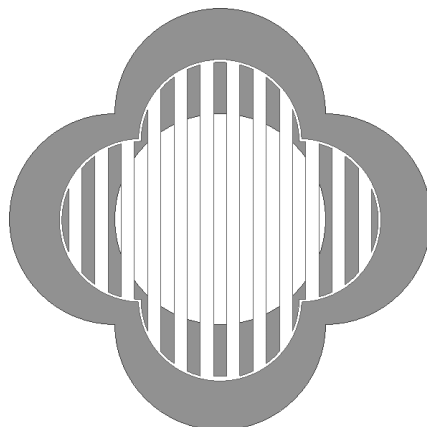


Figure A

3 marks

- e. In the space provided below, sketch TWO ideas for your chosen design brief. Enhance your sketches by adding colour and notes.

IDEA 1:

IDEA 2:

4 marks \times 2 = 8 marks

3. Carefully study Figure B which shows a 3D drawing for the air freshener together with the block from which it was made.

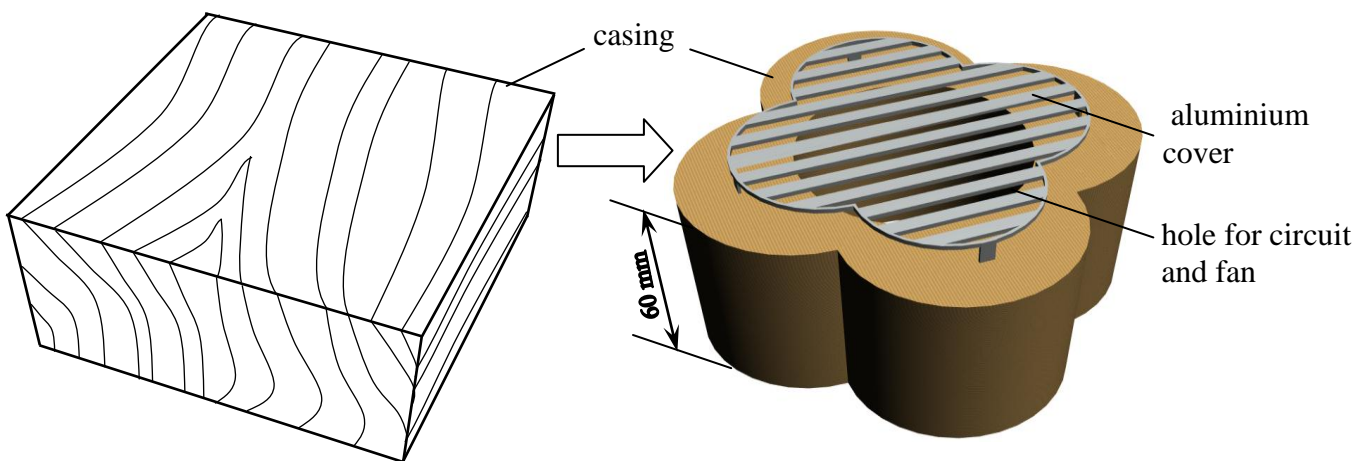


Figure B

- a. Name the type of material suggested for the casing of the air freshener. _____
1 mark
- b. Give TWO reasons why this type of material was used.

1 mark \times 2 = 2 marks

c. The designer decided to change the material of the casing and use MDF.

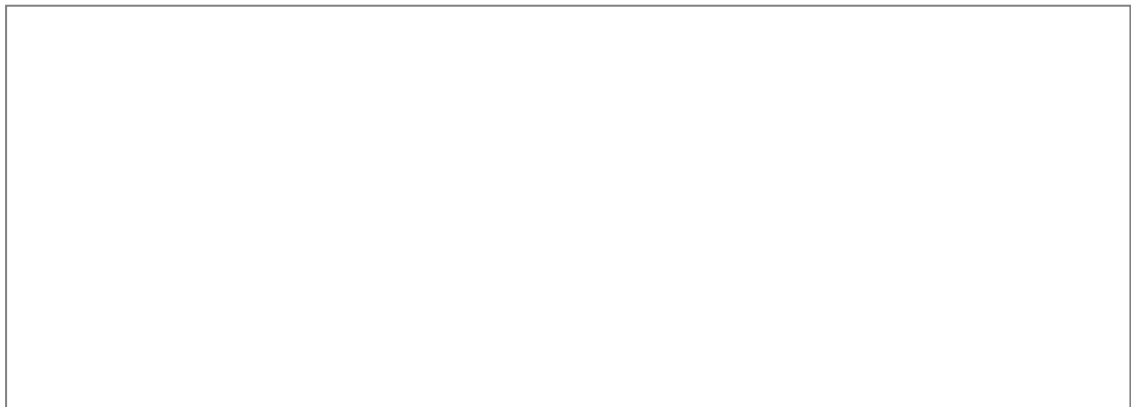
i. What does MDF stand for? _____

1 mark

ii. Write ONE reason why the designer could have changed the material of the casing.

1 mark

iii. 60mm thick MDF is not found as standard size. In the space below, illustrate how you would obtain such a thickness from MDF.



2 marks

4. The top protective cover of the air freshner shown in Figure B is made from sheet aluminium.

a. Describe the main difference between ferrous and non ferrous metals.

2 marks

b. What type of metal is Aluminium? _____

1 mark

c. Mention ONE property of Aluminium related to its use as a cover for the air freshener.

1 mark

d. Thin sheet aluminium can be cut by using a pair of tinsnips. On Figure C, label the blades and the grips of this tool.



Figure C

$\frac{1}{2}$ mark \times 4 = 2 marks

- e. List TWO products which are made from aluminium.

1 mark $\times 2 = 2$ marks

5. Figure D shows the electronic components involved to manufacture the air freshener circuit. The scent is aerated by means of a fan.

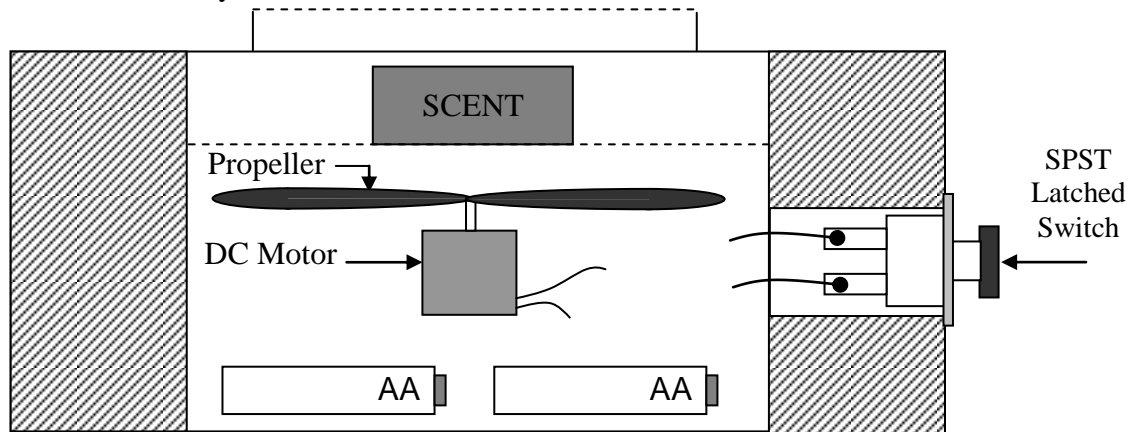


Figure D

- a. On Figure D, label the AA type batteries.

1 mark

- b. What is the voltage of ONE AA type battery? _____

1 mark

- c. Calculate the total voltage of TWO AA type batteries connected IN SERIES.

2 marks

6. An SPST latched type switch is used to turn ON/OFF the given air freshener circuit shown in Figure D.

- a. In the space provided, draw the electronic symbol used for an SPST switch.

1 mark

- b. What does SPST switch stand for? _____

1 mark

- c. Write down ONE disadvantage of using an SPST non latching switch in the design of the air freshener circuit.

2 marks

- d. What tool is used to solder the wire ends with the switch terminals?


- e. Mention TWO safety precautions that should observe during soldering.

1 mark × 2 = 2 marks

7. a. On Figure D, show how the electronic components involved to manufacture the air freshener can be possibly wired (connected). Note that the DC motor needs 3V to work properly.

4 marks

- b. In the space provided below, use electronic symbols only to draw the electronic circuit diagram of the layout shown in Figure D. The symbol of the motor is given.

DC Motor symbol: 

3 marks

- c. Identify the stage where each component is used by marking a tick (✓) in the appropriate column.

Electronic component	Stage		
	INPUT	PROCESS	OUTPUT
AA type battery			
SPST latched switch			
DC motor connected to propeller			

1 mark × 3 = 3 marks

8. Figure E shows a pair of safety glasses which includes a small torch on each side



Figure E

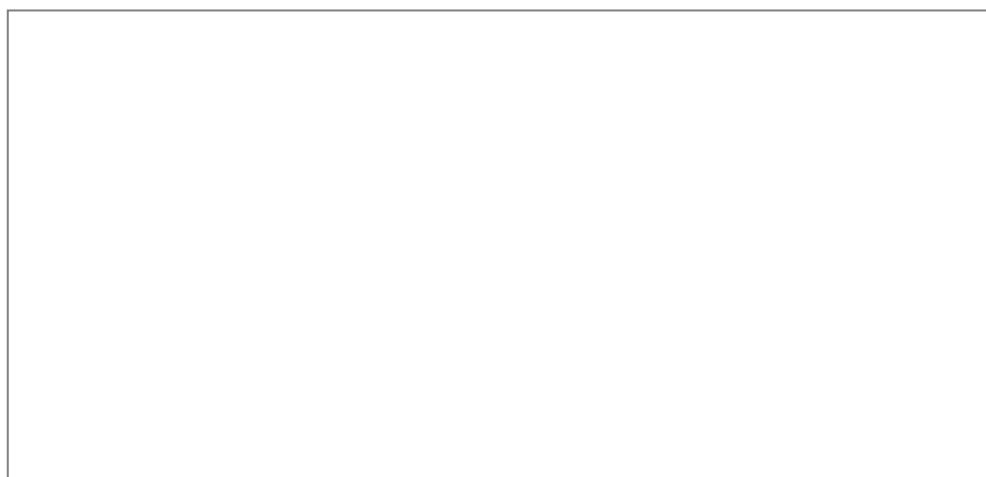
- a. Give ONE reason why you should wear this safety equipment.

1 mark

- b. Mention TWO cases where you should wear a pair of safety glasses during practical work in a Design and Technology workshop.

1 mark × 2 = 2 marks

- c. In the space provided, draw the sign which encourages you to put on the safety glasses in the workshop.



3 marks

9. The pair of safety glasses is made from two different types of plastics, both of them being thermoplastics.

- a. Explain what the term thermoplastic means.

1 mark

b. State TWO properties which the plastic of the lens should have.

1 mark \times 2 = 2 marks

c. State TWO properties which the plastic of the adjustable arm should have.

1 mark \times 2 = 2 marks

d. Give TWO advantages of using plastic rather than metal for the safety glasses.

1 mark \times 2 = 2 marks

10. Figure F shows a view of the two parts which make up the casing of the torches attached to the safety glasses. This casing will house the electronic circuit.

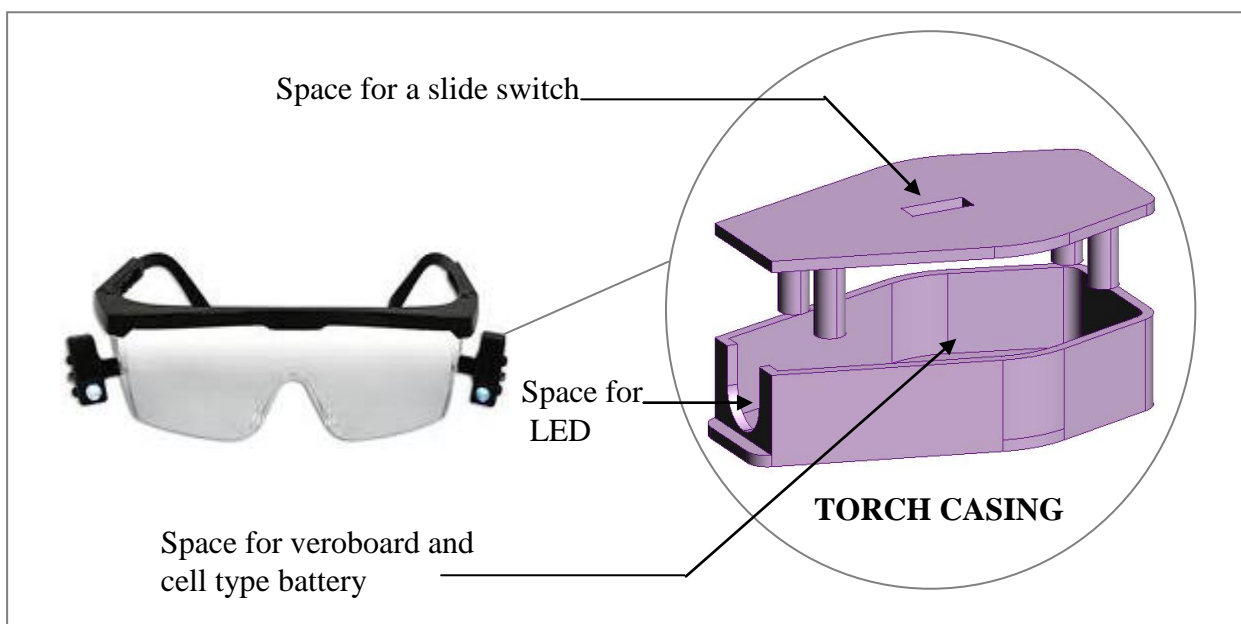


Figure F

a. Suggest a joining method by which the two parts of the torch casing can be kept together:

i. temporarily (can be disassembled): _____

ii. permanently (cannot be disassembled): _____

1 mark \times 2 = 2 marks

- b. Choose ONE joining method from the ones you mention in question 10a which to use in this situation and give ONE reason for your answer.

METHOD: _____

REASON: _____

1 mark \times 2 = 2 marks

11. a. Figure G shows a 3V button cell used in the casing as depicted in Figure F. Give ONE reason why a cell button is more suitable than a PP3 type battery for the safety glasses torch.

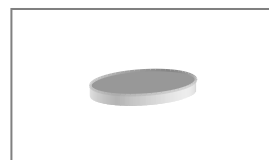


Figure G

2 marks

- b. On Figure H, label the anode and the cathode of the LED.

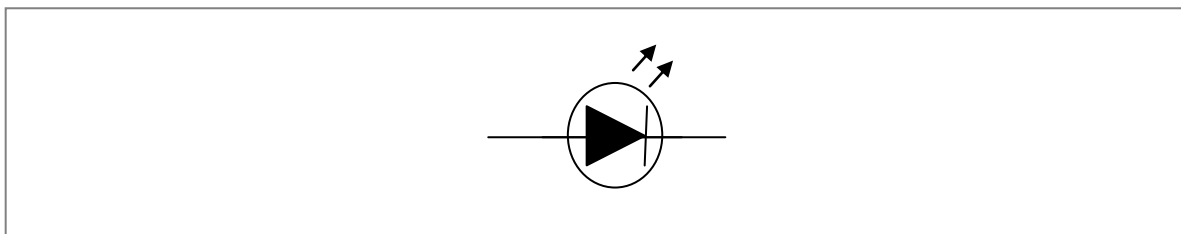


Figure H

1 mark

- c. Mention ONE electronic product, other than torches, where LEDs are used.

1 mark

12. Figure I shows part of the electronic circuit used in the safety glass torches.

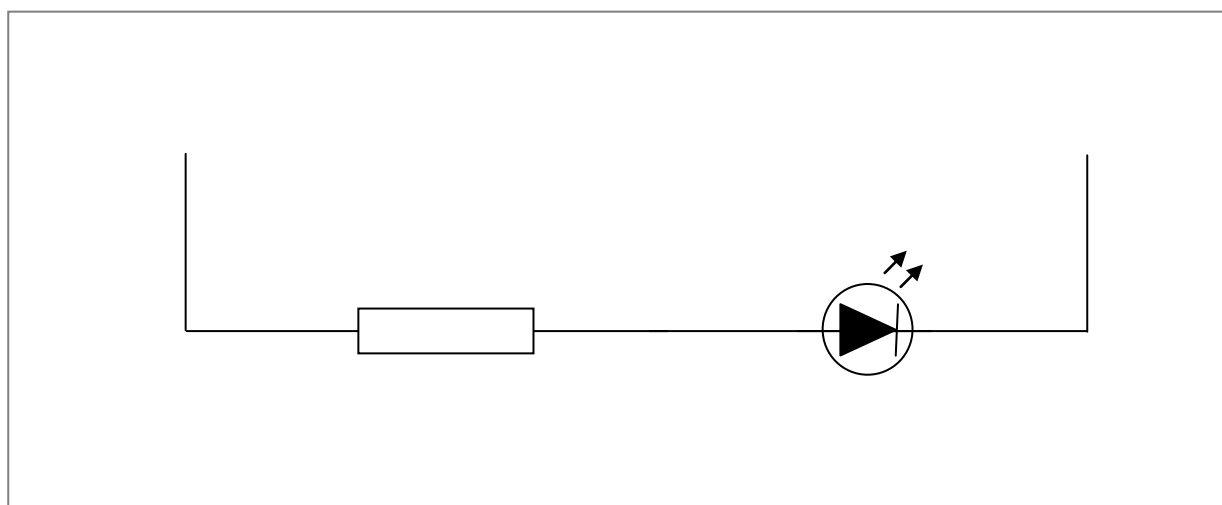


Figure I

- a. On Figure I, use electronic symbols only to complete the electronic circuit, showing how a slide switch and a battery are to be connected. 1 mark
- b. On Figure I, label the fixed resistor. 2 marks
- c. On Figure I, show how a voltmeter is to be connected to check the voltage across the fixed resistor. 2 marks
- d. Using the Ohm's Law where $V = I \times R$, calculate the value of the fixed resistor shown in Figure I if the LED needs 2.2V and 0.018A to light.

2 marks

13. Figure J shows the component side and soldering side of a veroboard.

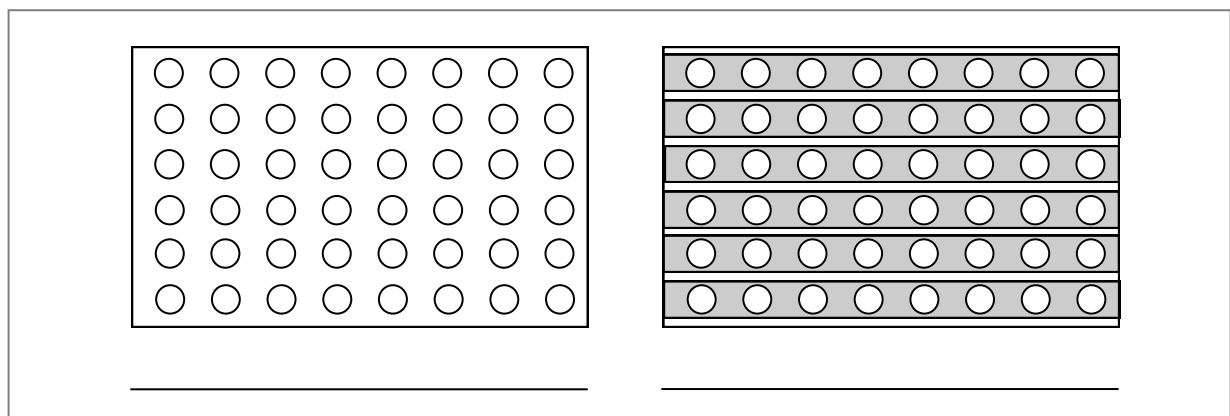


Figure J

- a. On Figure J, label the component side and the soldering side. 1 mark \times 2 = 2 marks
- b. State whether the sentence below is TRUE or FALSE.


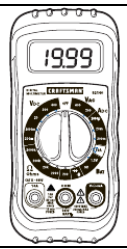
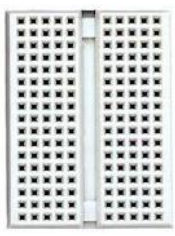

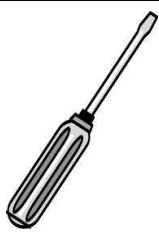
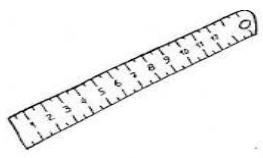
The tracks found on the veroboard are conductive.	
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1 mark

- c. By drawing on Figure J, show how the electronic circuit you completed in Figure I is to be connected on the appropriate side of the veroboard.

3 marks

14. Complete the table below by naming each tool and describe its use.

TOOLS		
PICTURE	NAME	USE
		
		
		
		
		
		

9 marks