

Annual Examinations for Secondary Schools 2022

YEAR 9	DESIGN AND TECHNOLOGY	TIME: 2 hours
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Name: _____

Class: _____

----- **Note to students:** -----

You are required to answer all questions.

Use of calculator is allowed. Geometry drawing instruments are required.

FOR TEACHERS' USE ONLY

DISTRIBUTION OF MARKS

	Areas corrected			Marks for Written Exam	Marks for Design Folio	TOTAL	FINAL MARK
	Core D&T	Design	Technology				
Max. Mark	20	25	55	100	100	200	%
Student's mark							

Enter student's mark obtained in every section in the above table.

Core D&T is based on all the subject aspects; **Design** covers the Design aspect, and **Technology** covers Materials (20-25), Systems & Control (25-30) and Graphics (5-10), within the Technology aspect of D&T.

Section A: Core D&T

(20 marks)

- 1) From **Figure 1**, identify the mechanical system and answer the following questions.

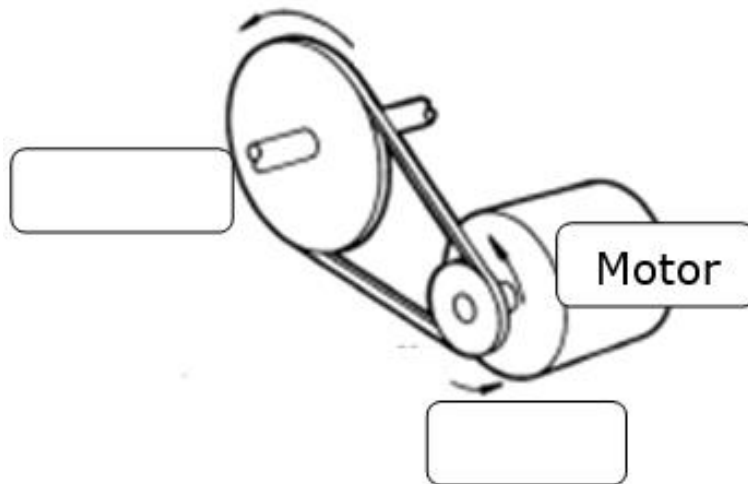


Figure 1

- Mechanical system: _____
- In the given spaces mark the input and output.
- Does this system produce a faster rotary velocity? _____

(1 mark x 3 = 3 marks)

- 2) In the space provided below, mention **TWO** safety precautions that must be observed while working in a Design and Technology workshop.

- _____
- _____

(1 mark x 2 = 2 marks)

- 3) From the given list below, complete the following paragraph.

mined, conductive properties, non-ferrous.

Copper is a _____ metal and its ore is _____ as a pure mineral. The consumer electronics industry frequently uses copper because of its _____.

(1 mark x 3 = 3 marks)

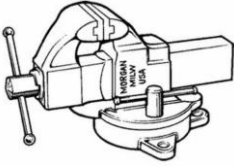
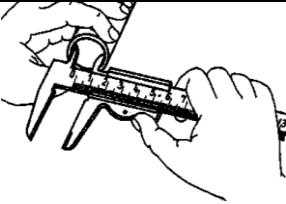
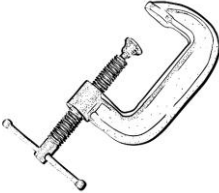
- 4) From the given list, categorise these terms in the appropriate column.

wool, cotton, silk, flax

Cellulose based fibres	Protein based fibres

(1 mark x 4 = 4 marks)

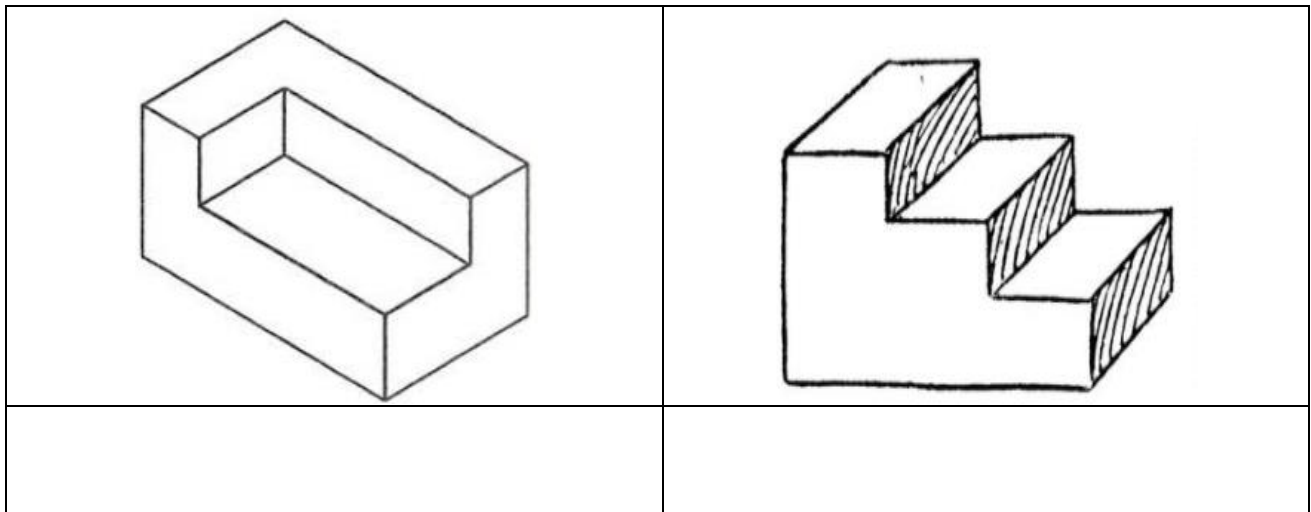
- 5) In the table below, write the name and use of each tool.

Tool	Name	Use
		
		
		
		
		
		

(½ mark x 12 = 6 marks)

6) From the following images, name the correct pictorial projection:

Oblique projection, Isometric projection



(1 mark x 2 = 2 marks)

Section B: Design Aspect

(25 marks)

Please read the following Design Situation, which needs to be used for Section B.

A Design and Technology teacher sets a situation to his Year 9 students. They must analyse a product that is already on the shelf for sale and try to improve various design aspects and create a better version. The product is a plant humidity sensor that helps the user to remember when to water the plants.

Figures 2, 3 and 4 show three products that are already available on the market. The products include an electronic circuit inside.



Figure 2



Figure 3



Figure 4

- 7) **Figures 2, 3 and 4** are part of market research. Mention **TWO** other research aspects that can be carried out before one can start sketching the ideas and state the reason **WHY**.

a) _____

WHY: _____

b) _____

WHY: _____

(1 mark x 4 = 4 marks)

- c) In your own words explain why it is important to build a prototype or model of a product before it is produced.

(2 marks)

- d) Mention **ONE** suitable material name that can be used for prototyping.

(1 mark)

- 8) In the space provided below complete a list of **FIVE** important specifications that the new modified humidity sensor needs to have. The first one is given as an example.

a)	The design must include one sustainable feature.
b)	The design
c)	The design
d)	The design
e)	The design

(1 mark x 4 = 4 marks)

- 9) In the space provided, referring to **Figures 2, 3** and **4**, and your **specifications**, sketch **TWO** modified design ideas for the humidity sensor body.

Note: At this stage do not consider the actual circuit but leave enough space for it inside and for components that might be used outside. All sketches must include colour, annotations, an indication of materials and basic measurements. Outline any sustainable features or reused materials being used.

Idea 1.

Idea 2.

(5 marks x 2 = 10 marks)

- 10) In your own words, describe why it is important to include reused materials in our projects.

(2 marks)

- 11) Choose **ONE** idea and explain how it can be suitably **tested** and **evaluated**.

(1 mark x 2 = 2 marks)

Section C: Technology Aspect

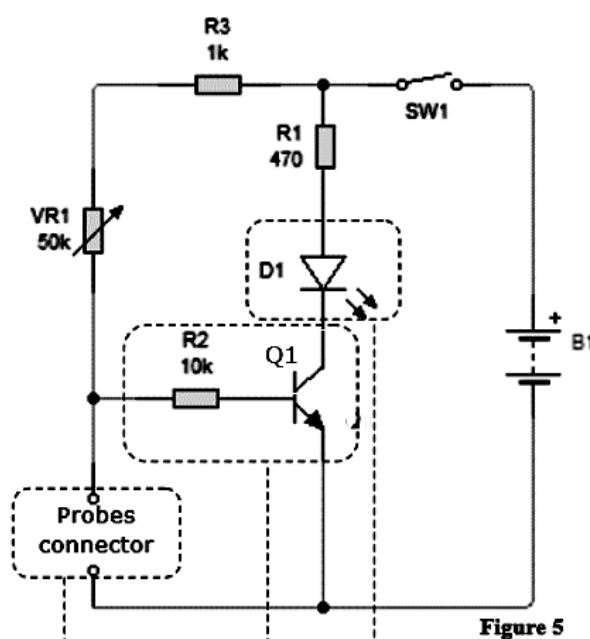
(55 marks)

- 12) **Figure 5** shows a schematic diagram of a typical electronic solution for a plant humidity sensor.

In the table below, name the components used in the circuit.

	Component name
B1	
SW1	
R1	
D1	
VR1	
Q1	

(1 mark x 6 = 6 marks)



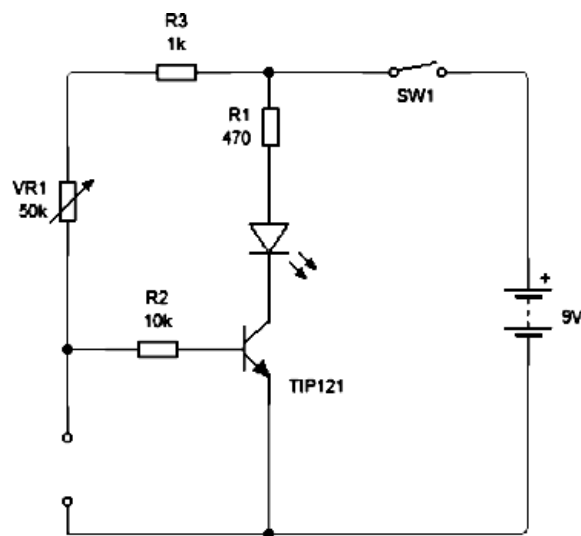
System diagram

- 13) Fill in the **system diagram** with the suitable terminology given below, that describes the dotted highlighted parts of the circuit in **Figure 5**.

process - output - input

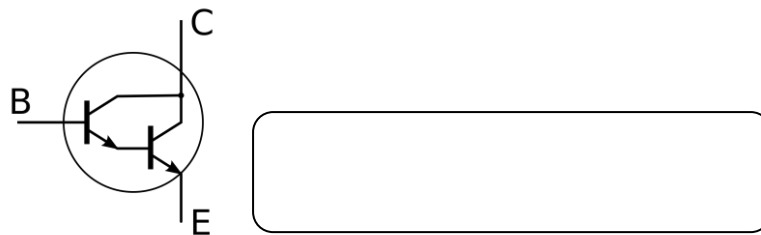
(1 mark x 3 = 3 marks)

- 14) On the circuit given below, complete the circuit by adding a buzzer in the right position to act as an output component. The buzzer symbol is shown on the right-hand side.



(2 marks)

- 15) Name the configuration of the given components, when connected as shown below.



(2 marks)

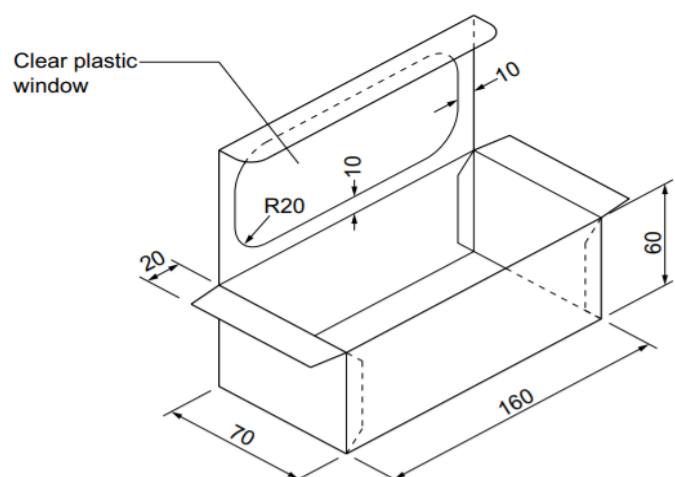
- 16) From **Figure 5**, select **TWO** components that are connected in series and sketch them in the space given below.

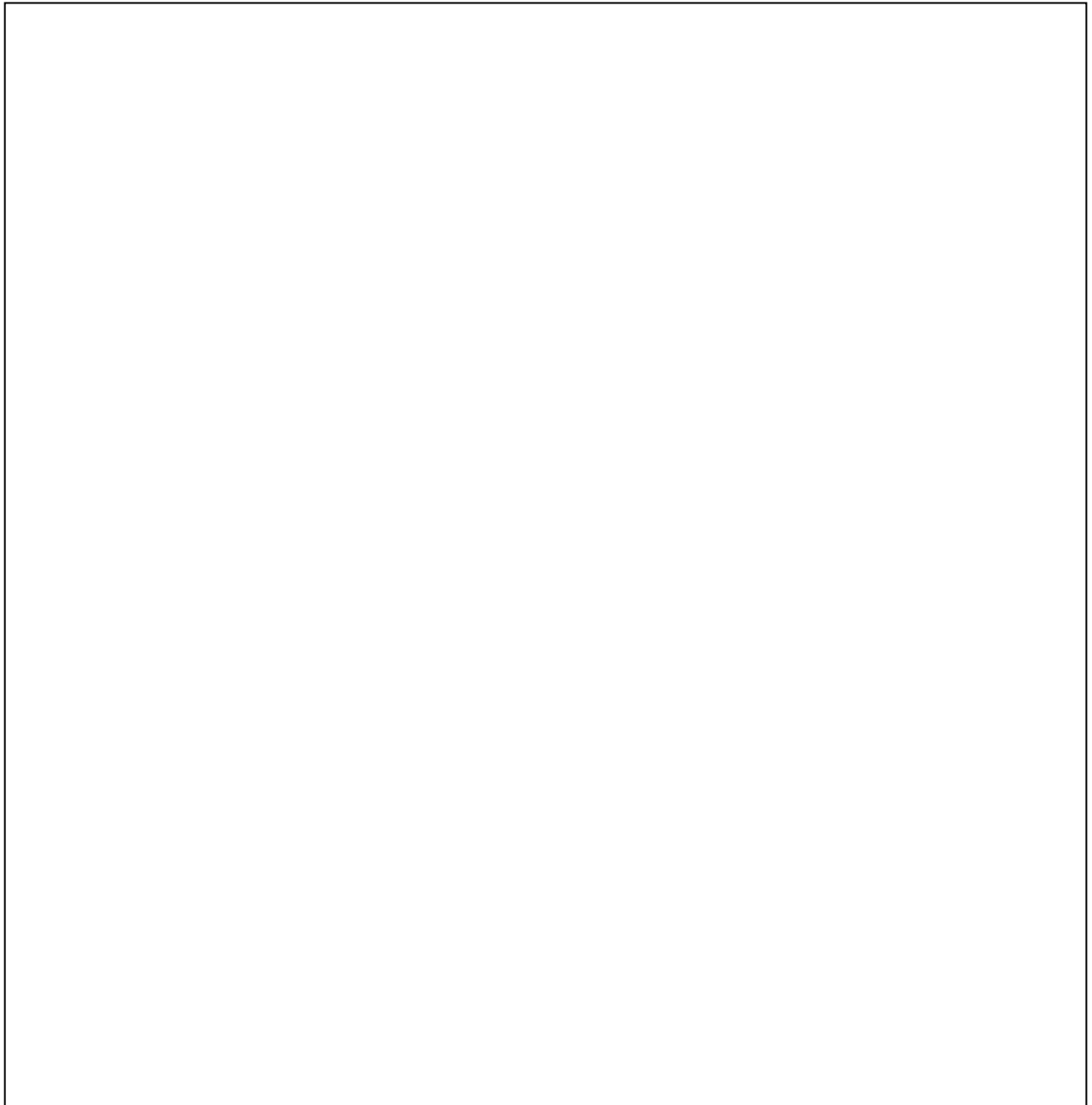


(2 marks)

- 17) **Figure 6** is a packaging for the plant sensor.

- a) In the space given, draw to **half scale** a net development of this packaging. In your drawing add flaps for gluing and folding lines. Assume dimensions that were not given.





(5 marks)

- b) Suggest a suitable material that can be used to produce the packaging of **Figure 6** and explain why.

Material: _____

Why: _____

(1 + 2 marks = 3 marks)

- 18) **Figures 7 and 8** are DIY recycled fabric pocket planters specially made for contemporary urban houses.



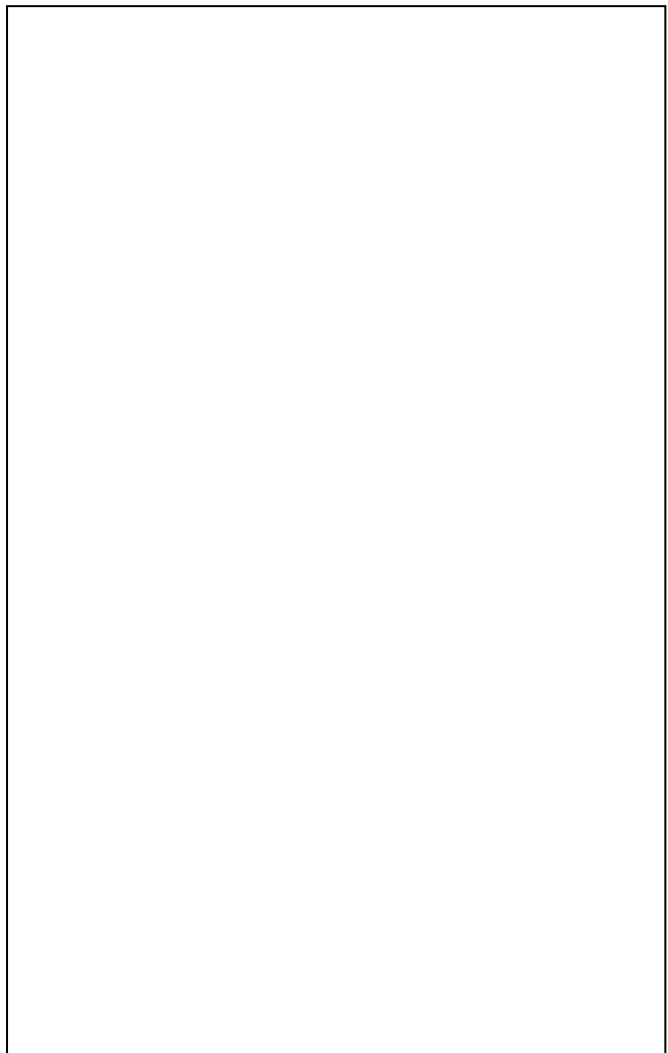
Figure 7



Figure 8

In the space provided, sketch a similar idea that contains **THREE** pockets together in a vertical position.

The sketch must include what recycled fabrics and types of fasteners are used. Add annotations, colours, materials, and basic dimensions to your sketch. The sketch must show clearly how fabrics will be joined together.



(7 marks)

- 19) **Figure 9** shows a mechanical system used in a greenhouse to keep temperature inside constant.

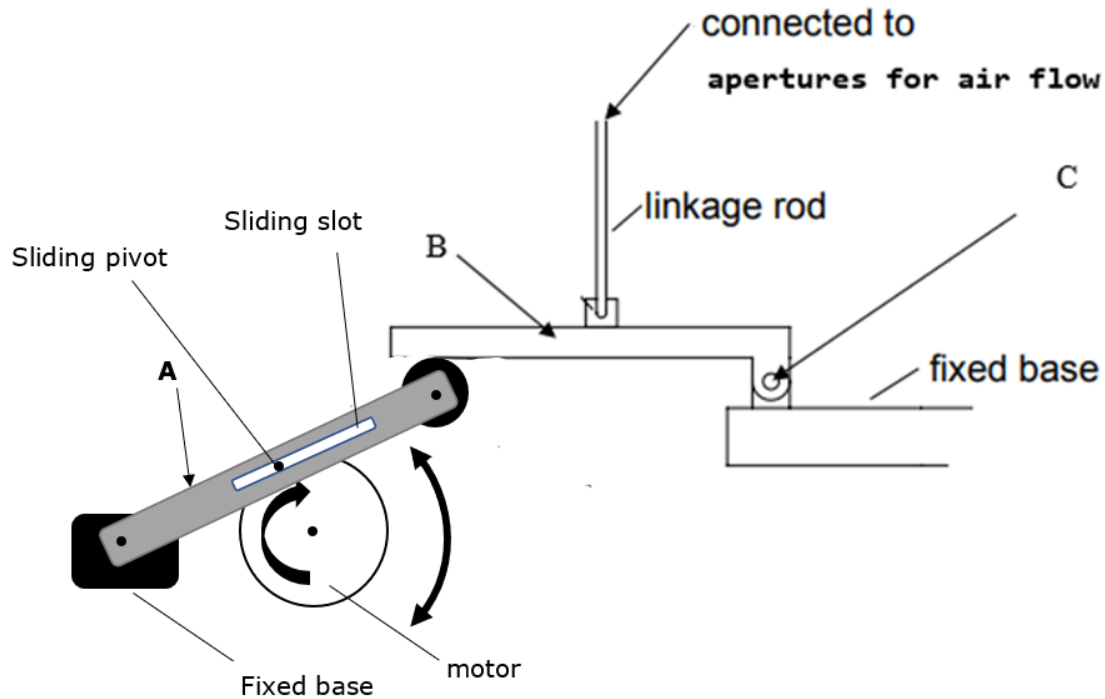


Figure 9

At this position the apertures are open so that the temperature inside the greenhouse does not become very high during the day.

In your own words **name** and **explain** the use of components A, B and C within this mechanical system.

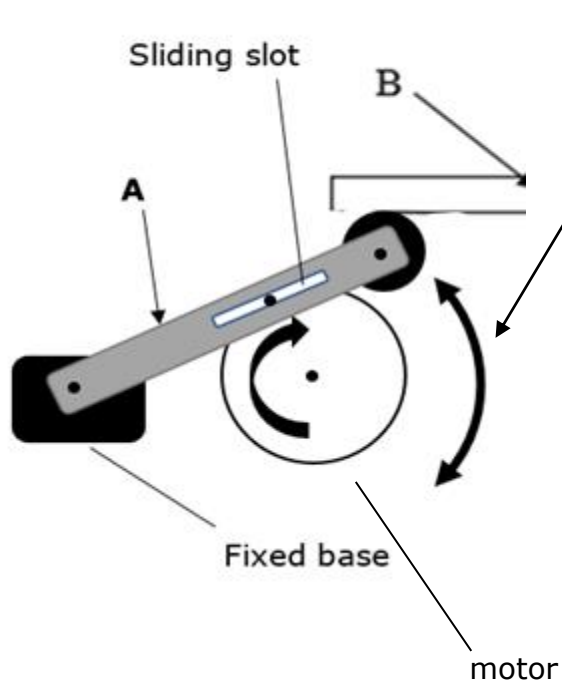
a) Part A

b) Part B

c) Part C

(2 marks x 3 = 6 marks)

20) Below are parts from the whole mechanism in **Figure 9**. Answer the following questions accordingly:



a) From the given list, tick the type of movement produced by part **A**.

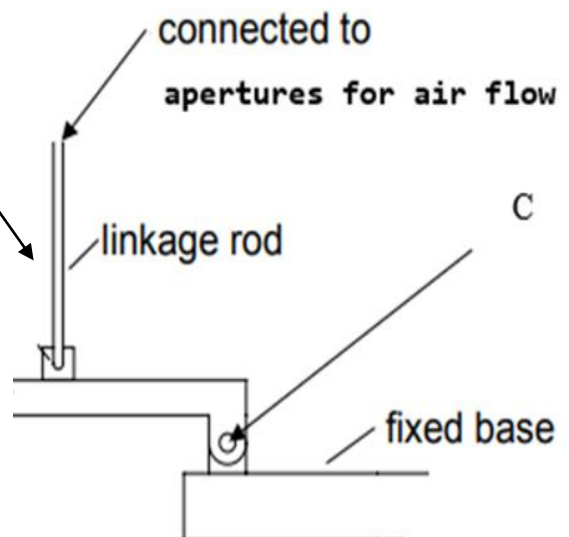
Linear	Rotary	Oscillation
☐	☐	☐

b) From the given list, tick the type of movement produced by the motor.

Linear	Rotary	Oscillation
☐	☐	☐

c) From the given list, tick the type of movement produced by the linkage rod when the whole mechanism is working.

Linear	Rotary	Oscillation
☐	☐	☐



(1 mark x 3 = 3 marks)

- 21) **Figure 10** represents a wheelbarrow. Use the words given to fill in the spaces below with the correct terminology:

Load – effort - fulcrum

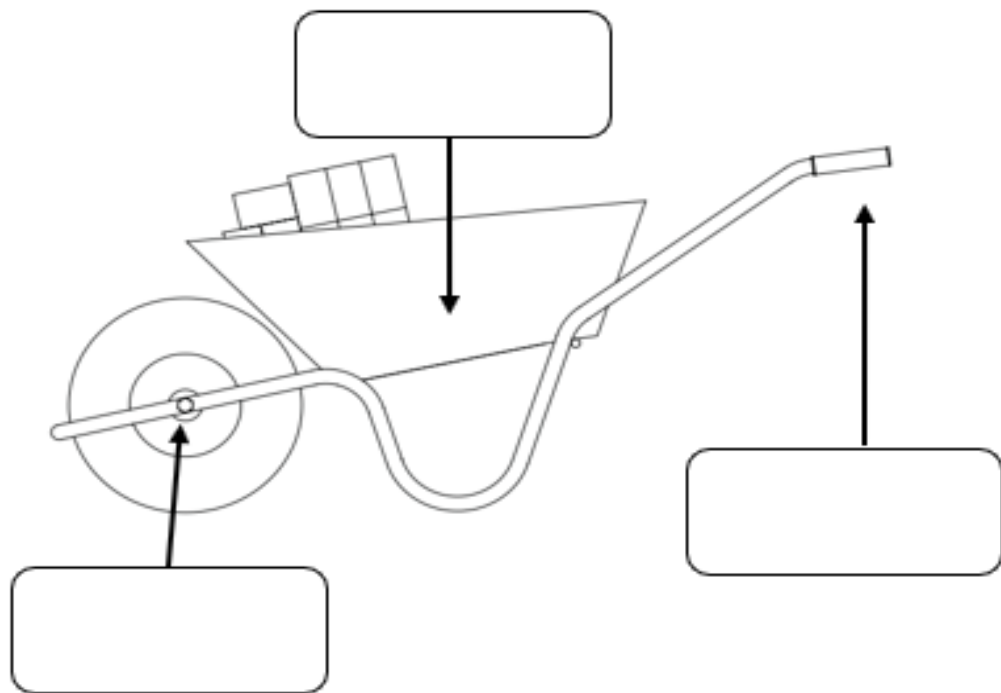


Figure 10

(1 mark x 3 = 3 marks)

- 22) Identify the type of lever which is being represented in **Figure 10**.

(2 marks)

- 23) Mention **TWO** methods that can reduce the effort required by the user to lift the weight of the wheelbarrow in **Figure 10**:

- i) _____
ii) _____

(1 mark x 2 = 2 marks)

- 24) Use **TWO** primary colours to add colouring to any part of the wheelbarrow in **Figure 10**.

(1 mark x 2 = 2 marks)

- 25) **Figure 11** represents a schematic circuit diagram that operates an output component to warn the farmer that the green house door is open. SW2 is connected with the greenhouse door system. **IC1** is programmed so that the buzzer (BZ2) produces an output for a certain amount of time.

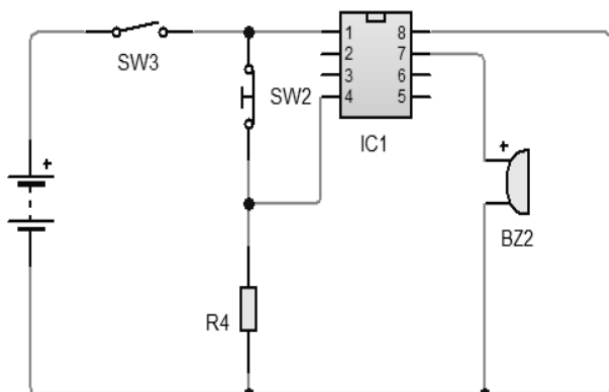
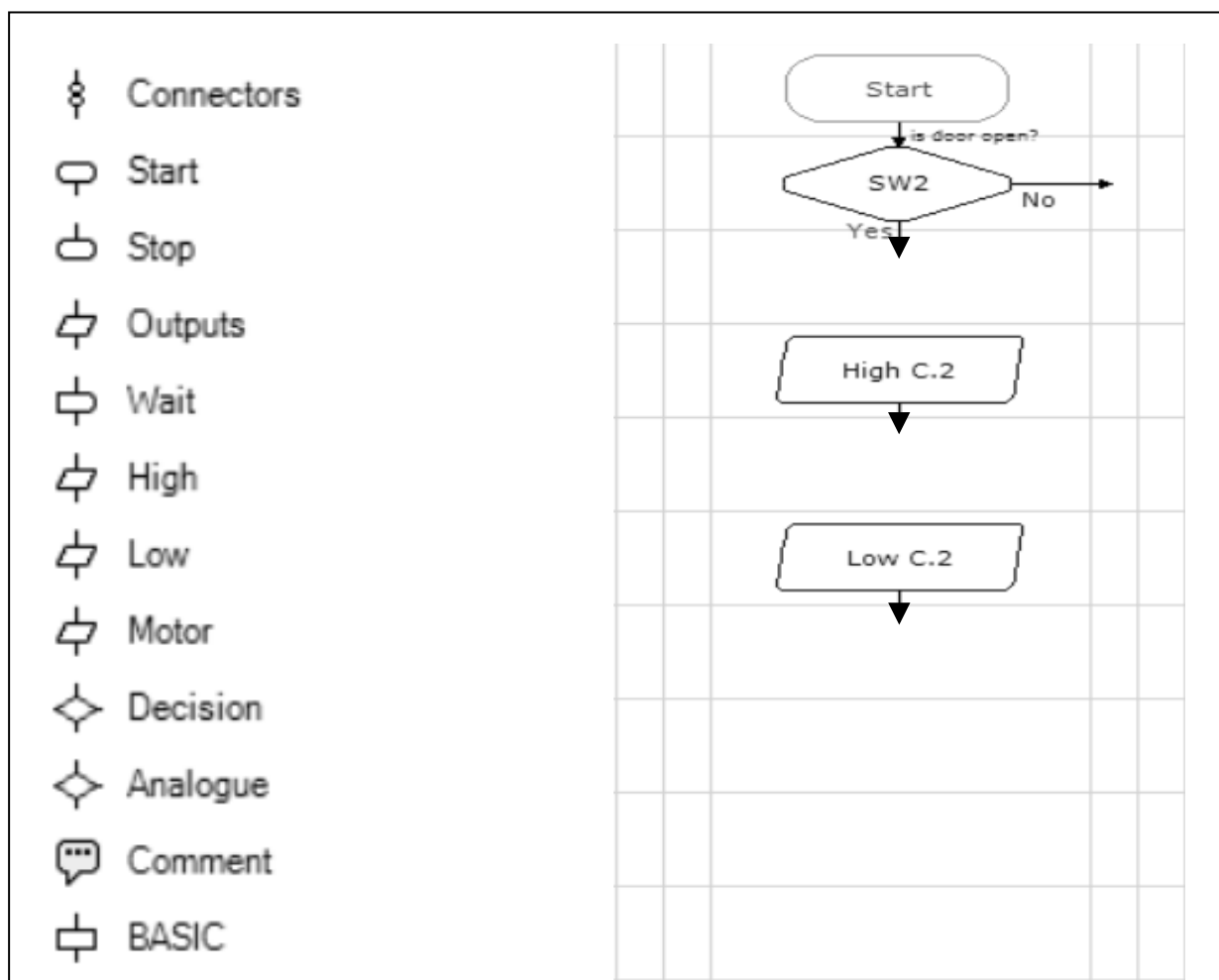


Figure 11

a) Write the name of component IC1.	
b) Voltage needed to operate IC1.	
c) What type of switch is SW2?	

(1 mark x 3 = 3 marks)

- 26) In the space given below, use the common commands given at the left side to continue the program. The buzzer **BZ2** of **Figure 11** must operate for 10 seconds, starting after the greenhouse door has been left open for 15 seconds. Complete the arrows so that the circuit will restart after full execution.



(4 marks)