



General Certificate of Secondary Education

Centre Number

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Candidate Number

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Technology and Design

Unit 1:

Technology and Design Core Content



[GTY11]

GTY11

Assessment

TIME

1 hour 30 minutes.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Questions which require drawing or sketching should be completed using an H.B. pencil.

All other questions must be completed using black ink only.

Do not write in pencil or with a gel pen.

Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Quality of written communication will be assessed in Question **10**.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

The Formula sheet is on page 3.

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Formulae for GCSE Technology and Design

You should use, where appropriate, the formulae given below when answering questions which include calculations.

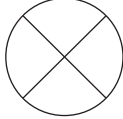



- 1 Potential Difference = current \times resistance ($V = I \times R$)
- 2 Series Resistors $R_t = R_1 + R_2 + \dots + R_n$
- 3 Gear ratio of a simple gear train = $\frac{\text{number of teeth on driven gear}}{\text{number of teeth on driver gear}}$
- 4 Velocity Ratio = $\frac{\text{diameter of driven}}{\text{diameter of driver}}$



1 **Table 1** refers to a number of symbols.

(a) Using the first row as a guide, complete the table.

Table 1

Sketch of Symbol	Type of Symbol	Name of Symbol
	Electronic	Bulb
	Electronic	
		
		Wait
		

[7]



(b) (i) Write down the **name** of the electrical unit used to measure current and the electrical unit used to measure resistance.

Current _____ [1]

Resistance _____ [1]

(ii) In the space below draw the circuit symbol for a voltmeter.

[1]

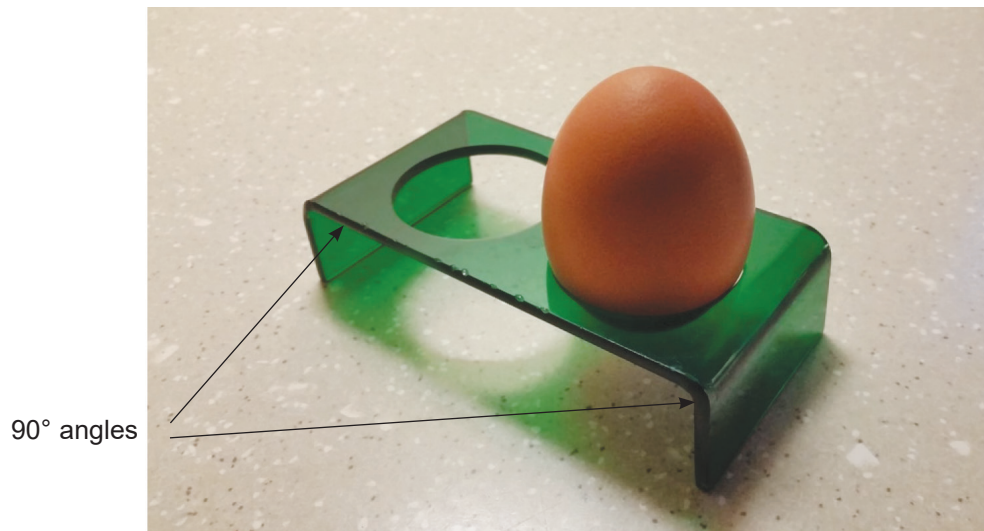
(c) State the essential difference between a ferrous metal and a non-ferrous metal.

_____ [2]

[Turn over



2 (a) Fig. 1 shows an egg holder which is made from one piece of acrylic.



Source: Principal Examiner

Fig. 1

Fig. 2 shows the acrylic before it is bent into shape.

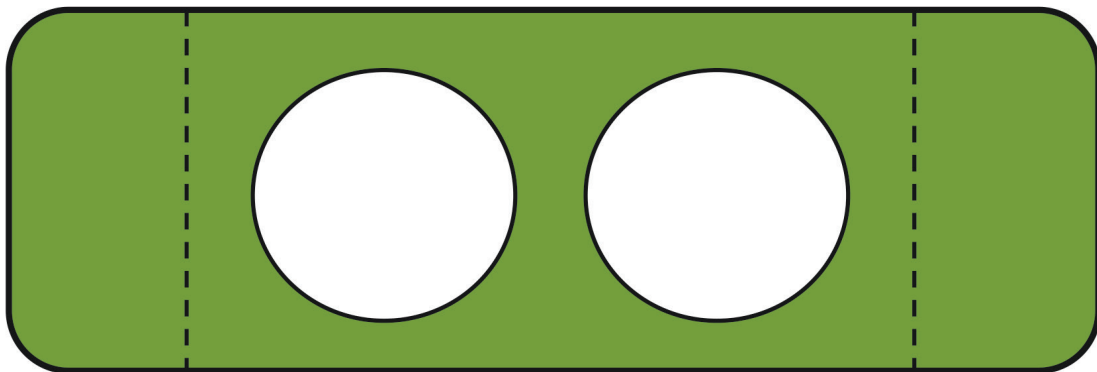


Fig. 2



Select, by inserting a tick (✓) in the appropriate boxes, the **two** most suitable properties from the list below, that make acrylic an appropriate material for the egg holder.

Cheap

Strong

Easy to shape when heated

Brittle

Lightweight

[2]

(b) Suggest how the acrylic could be heated prior to bending.

[1]

(c) Describe how the holes could be produced in the acrylic egg holder shown in **Fig. 2**.

[4]

[Turn over



(d) A company has decided to manufacture a large number of egg holders. CAD and CNC are to be used to produce the acrylic egg holders.

(i) State **three** advantages (other than cost) for using CAD/CNC to produce the large number of egg holders.

[3]

(ii) Outline how the 90° bends can be produced for the large number of acrylic egg holders.

[1]





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[Turn over



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3 Fig. 3 shows a workshop pillar drill and its drive system.



Source: Principal Examiner

Fig. 3

(a) Select the word from the list below to describe the input motion of the drive system and select the word from the list below to describe the output motion of the drive system in Fig. 3.

Reciprocation

Linear

Rotary

Oscillating

(i) Input motion: _____ [1]

(ii) Output motion: _____ [1]



(b) (i) Name the drive system that has been used in the pillar drill.

[1]

(ii) In the space below, draw the mechanical symbol for the drive system used in the pillar drill in **Fig. 3**.

[1]

(iii) Describe how the drive system of the pillar drill works after the machine has been switched on. Your answer should make reference to:

- the input,
- the process,
- the output of the pillar drill.

[3]

(iv) Outline a safety feature of this drive system.

[1]

[Turn over



4 (a) Fig. 4 shows a pneumatic component symbol.

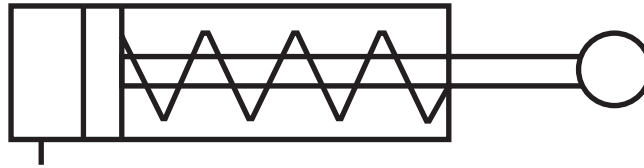


Fig. 4

(i) Name the pneumatic component symbol shown in Fig. 4.

_____ [1]

(ii) What **two** features of this pneumatic component symbol are used to identify it?

_____ [2]



(b) A pneumatic circuit is shown in **Fig. 5**. The diagram shows a small guillotine that cuts pieces of metal into strips.

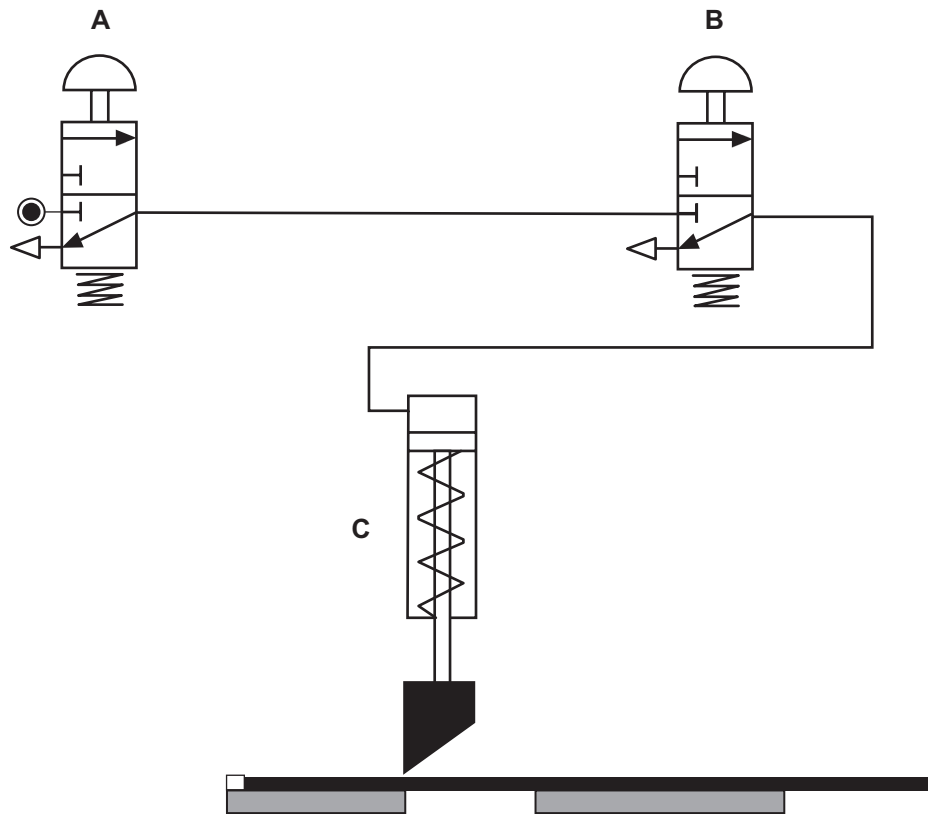


Fig. 5

(i) Name the component labelled **A**.

_____ [1]

(ii) The circuit uses two components, **A** and **B**, in a logic combination to activate it. Identify the logic sequence.

_____ [1]

(iii) Is the pneumatic component **C** used as an input, a process or an output in **Fig. 5**?

_____ [1]

[Turn over



5 (a) (i) Describe the purpose of a mould in the vacuum forming process.

[2]

(ii) Outline **four** important features that should be considered and included when designing and making a mould for use in the vacuum forming process.

1. _____

2. _____

3. _____

4. _____

[4]



(b) (i) Which of the two types of plastic shown below is used in the vacuum forming process?

- Thermoplastic
- Thermosetting plastic

_____ [1]

(ii) Outline **four** clear steps in the production of a vacuum formed product.

1. _____

2. _____

3. _____

4. _____

_____ [4]

[Turn over



- 6 The incomplete electronic circuit shown in **Fig. 6** requires an LED, an LDR and a resistor to be connected to complete the circuit.

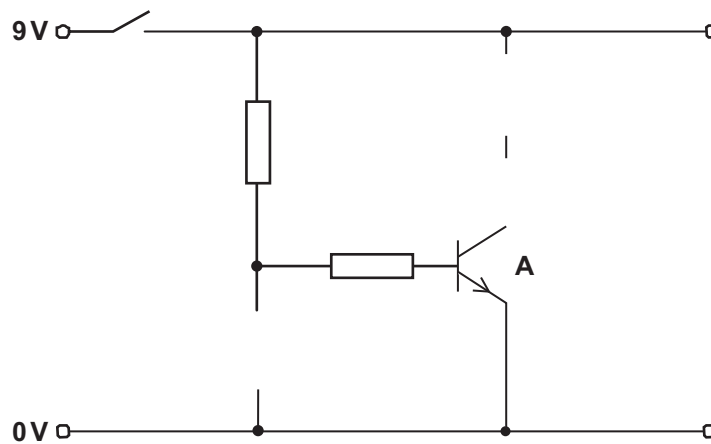


Fig. 6

- (i) Show where each component symbol should be connected in the circuit by writing **LED**, **LDR** or **Resistor** in the correct space in **Fig. 6**. [3]

- (ii) Name the component labelled **A** in **Fig. 6**.

_____ [1]

- (iii) Produce a neat drawing of the symbol of an **LDR** in the space below.

[2]

- (iv) Outline the purpose of the LDR in this circuit.

_____ [2]





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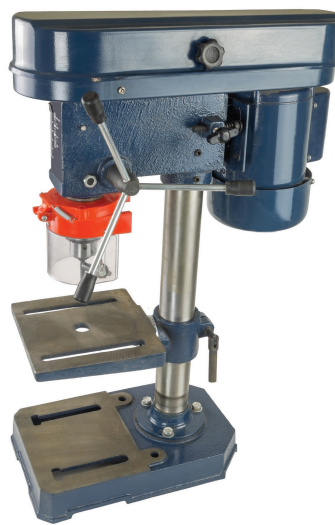


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- 7 Flow charts can be used for planning manufacturing processes. **Fig. 7** shows a pillar drilling machine.

Complete the flow chart in **Fig. 8** to illustrate the process of drilling a hole in a piece of aluminium using a pillar drill.

After the correct size drill bit has been selected it is inserted into the chuck of the drilling machine. The location of the hole is then marked out on the aluminium before it is clamped in position. A safety check must be carried out to ensure that the chuck key has been removed before switching on the machine. When the hole has been drilled, the machine should be switched off before removing the aluminium. The process is now complete.



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Fig. 7



START



[10]

Fig. 8

[Turn over

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8 (a) Complete **Table 2** by identifying or sketching the correct type of motion.

Linear has been done for you.

Table 2

Type of Motion	Sketch of Motion
Linear	
Rotary	
Oscillating	
	

[3]



(b) Fig. 9 below shows the symbol for a chain and sprocket system which connects an electric motor to a machine.

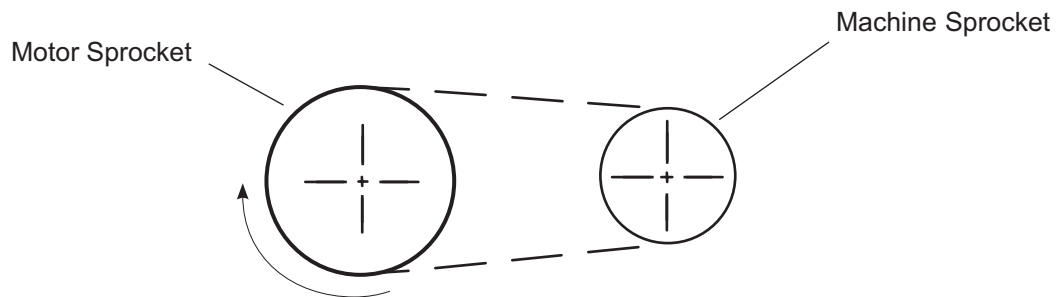


Fig. 9

Complete each of the following by placing a tick (✓) in the correct box.

(i) The machine sprocket rotates:

clockwise

anticlockwise

[1]

(ii) The motor sprocket is the:

driver sprocket

driven sprocket

[1]

(iii) The machine sprocket is the:

low speed sprocket

high speed sprocket

[1]

[Turn over



(c) (i) Explain why a chain and sprocket system is used on a bicycle.

Your answer should focus on **two** reasons.

[2]

(ii) Explain why the chain of the chain and sprocket system requires lubrication.

[2]

(d) If the motor sprocket has 66 teeth and the gear ratio is 1:3, calculate the number of teeth on the driven sprocket.

Answer _____ [3]





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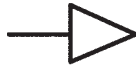
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9 (a) Name the pneumatic symbol shown below.



[1]

(b) Fig. 10 shows a pneumatic circuit for a cardboard box folding press.

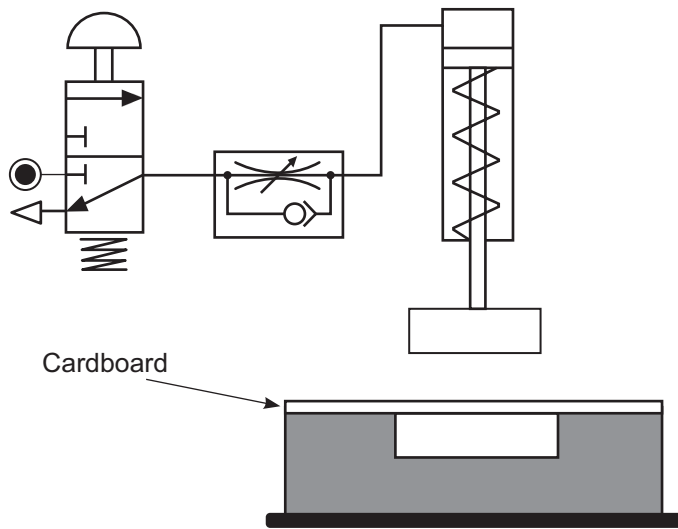


Fig. 10

(i) Name the component in the circuit which controls the speed of the piston rod.

[1]



(ii) In which direction does the component named in (b)(i) control the speed of the piston?

Tick (✓) the correct answer.

Instroke

Outstroke

[1]

(iii) Explain how the component named in (b)(i) controls the speed of the piston.

[2]

(iv) Give **one** reason why the speed of the piston rod is controlled.

[1]

(c) The manufacturer has decided to press two cardboard boxes at the same time. Develop **Fig. 11** below to show how you would do this.

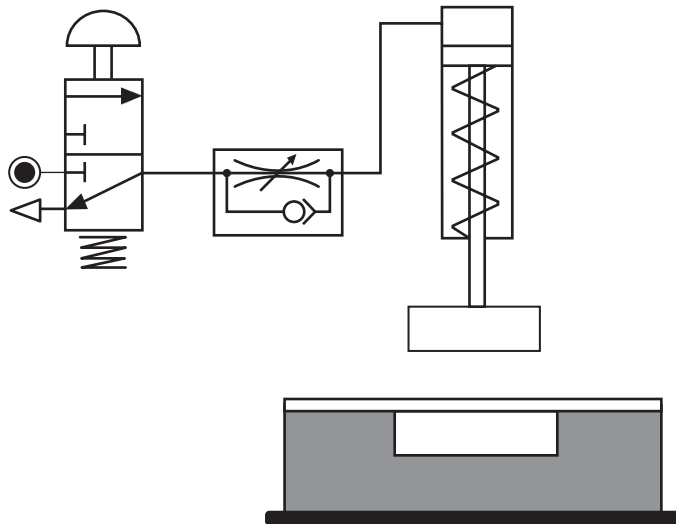


Fig. 11

[5]

[Turn over



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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
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7	
8	
9	
10	

Total Marks	
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Examiner Number

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