Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015

Technology and Design

Unit 1:

Technology and Design Core

GTD11

[GTD11]

THURSDAY 4 JUNE, AFTERNOON

TIME

1 hour.

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 blue or black ink only.
Do not write in pencil or with a gel pen.
Answer **all eleven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 90.
Quality of written communication will be assessed in Question **11**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

9376

BLANK PAGE

DO NOT WRITE ON THIS PAGE

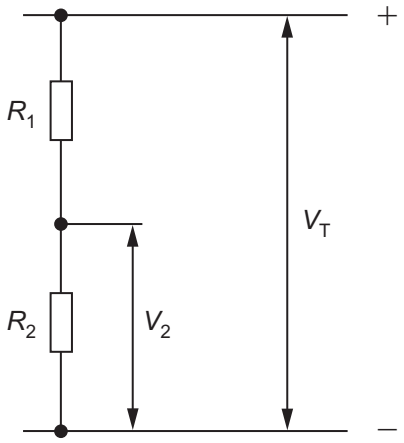
Formulae for GCSE Technology and Design

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

1 Potential Difference = current × resistance ($V = I \times R$)

2 For potential divider

$$V_2 = \frac{R_2}{R_1 + R_2} \times V_T$$



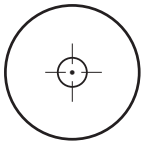
3 Series Resistors $R_T = R_1 + R_2 + R_3$ *etc*

4 Gear ratio of a simple gear train $= \dfrac{\text{number of teeth on driven gear}}{\text{number of teeth on driver gear}}$

[Turn over

1 **Table 1** shows a number of different symbols. Using the first row as a guide, complete the table.

Table 1

Sketch of Symbol	Type of Symbol	Name of Symbol
	Electronic	Bulb
		Buzzer
		
	Electronic	Ammeter
	Safe Condition Sign	
	Mechanical	Knife Follower
		

[9]

2 CAD drawings and CNC machines are frequently used in project work.

(a) (i) What do the letters CAD stand for?

_____ [1]

(ii) What do the letters CNC stand for?

_____ [1]

(b) Give **two** advantages and **one** disadvantage of using CNC compared to the manual manufacture of a product.

Advantage 1: _____

_____ [1]

Advantage 2: _____

_____ [1]

Disadvantage: _____

_____ [1]

[Turn over

3 **Fig. 1** shows a lever which is operated by a cam.

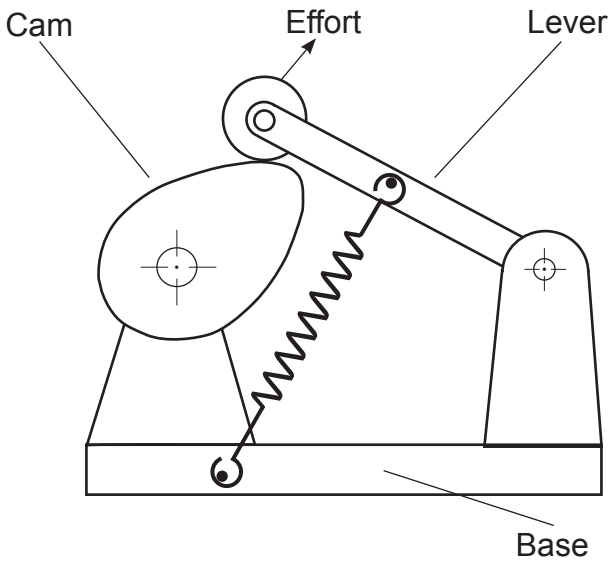


Fig. 1

"Modular Courses in Technology: Mechanisms", Schools Council, Pearson Education Limited © Schools Council 1981

(i) Name the type of cam and follower in **Fig. 1**:

Cam _____ [1]

Follower _____ [1]

(ii) State the type of motion of:

The cam _____ [1]

The lever _____ [1]

(iii) What class of lever is shown in **Fig. 1**?

_____ [1]

(iv) What would be the purpose of the spring shown in **Fig. 1**?

_____

_____ [1]

4 When designing a product a suitable finish for the material is very important.

(a) Name **two** reasons for applying a suitable finish to a material.

1. _____ [1]

2. _____ [1]

(b) Identify **two** specific finishes that are only used on metals.

1. _____ [1]

2. _____ [1]

(c) Identify **two** specific finishes that are only used on wood.

1. _____ [1]

2. _____ [1]

(d) Identify **one** suitable finish for plastic.

_____ [1]

[Turn over

5 **(a)** The letters **V**, **I** and **R** are used when working with electronic units and measurements.

(i) What is the name of the electronic unit represented by the letter **R**?

_____ [1]

(ii) What symbol is used for this electronic unit?

_____ [1]

(iii) What name is given to the electronic unit represented by the letter **I**?

_____ [1]

(b) The colour bands of the first three bands of a four band resistor are shown in **Fig. 2**. Use the information below to work out the value of this resistor.

0 = Black	1 = Brown	2 = Red	3 = Orange	4 = Yellow
5 = Green	6 = Blue	7 = Violet	8 = Grey	9 = White

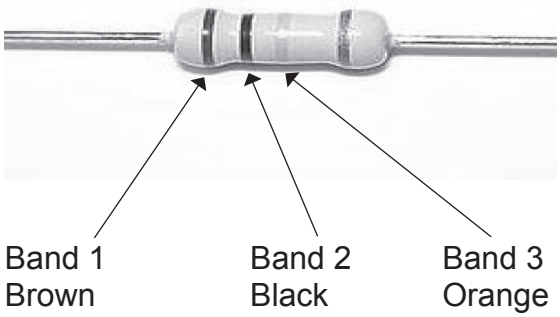


Fig. 2 *© Lefteris_ / iStock / Thinkstock*

Value _____ [3]

(c) The circuit shown in **Fig. 3** requires completion by adding a thermistor and a push-to-make switch. Complete the circuit by including the symbols for the thermistor and the push-to-make switch in the correct locations in **Fig. 3**.

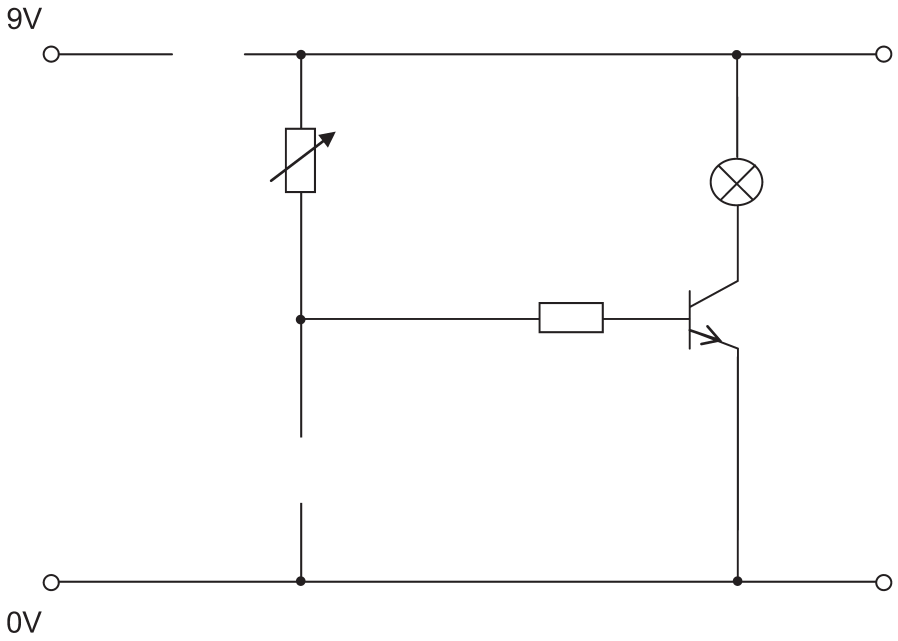


Fig. 3

[4]

6 **(a)** **Fig. 4** shows a pneumatic valve.

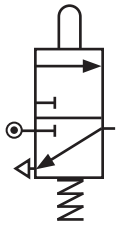


Fig. 4

(i) Name the type of valve shown in **Fig. 4**.

_____ [1]

(ii) Clearly label the air supply and the exhaust port on **Fig. 4**. [2]

(iii) For the valve in **Fig. 4** state:

Method of operation _____ [1]

Method of return _____ [1]

(b) A pneumatic circuit is shown in **Fig. 5**.

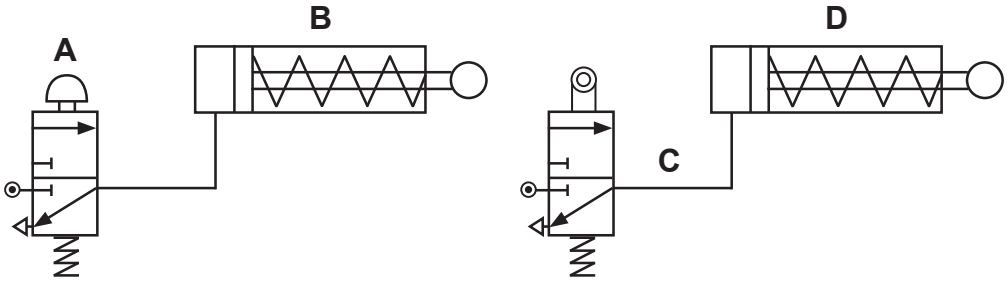


Fig. 5

Explain the operation of the circuit when:

Push-button **A** is pressed and held down.

_____

_____

_____

_____ [3]

Push-button **A** is released.

_____

_____

_____ [2]

[Turn over

7 **Fig. 6** shows a vacuum formed plastic container for storing small toys.

Source: Chief Examiner

Fig. 6

(i) Which category of plastic is suitable for vacuum forming the container?

_____ [1]

(ii) Name a suitable plastic for the container.

_____ [1]

(iii) The top of the container is shaped as shown.

Suggest **two** reasons for this design feature.

1. _____ [1]

2. _____ [1]

BLANK PAGE

DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)

8 **Fig. 7** shows an electronic circuit which contains seven components. The component symbols are labelled **A**, **B**, **C**, **D**, **E**, **F** and **G**.

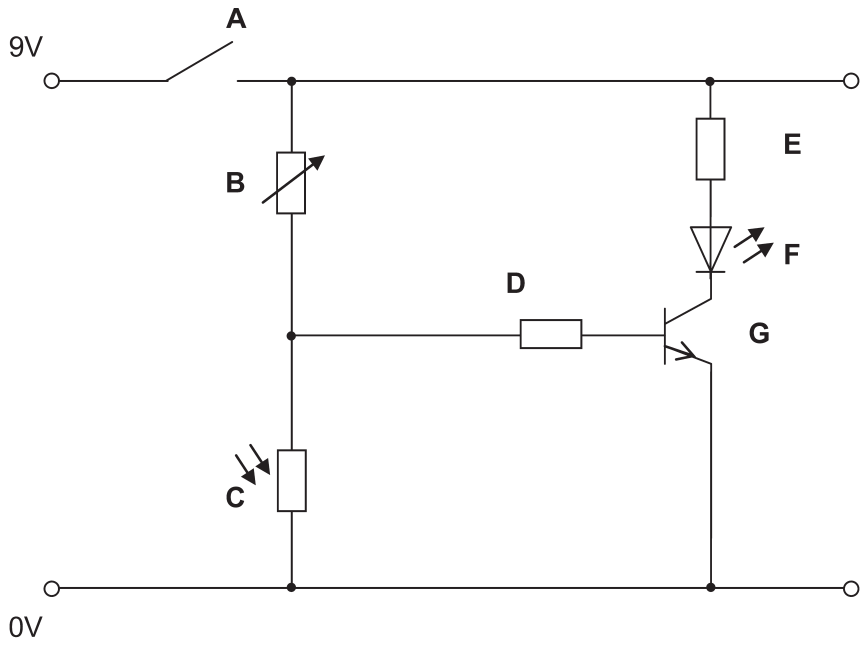


Fig. 7

(a) Complete **Table 2** by naming each of the electronic symbols **B**, **F** and **G**. Tick ✓ the appropriate column for each symbol to show if it functions as an Input, Process or Output component in this circuit.

Table 2

Component	Component Name	Input Component	Process Component	Output Component
B				
F				
G				

[6]

(b) With reference to components **A**, **B**, **C**, **G** and **F** only, explain how component **F** is operated in this circuit.

Component **A** _____

_____ [1]

Component **B** _____

_____ [1]

Component **C** _____

_____ [2]

Component **G** _____

_____ [2]

Component **F** _____

_____ [1]

[Turn over

9 **Fig. 8** shows a display stand for a watch. The display stand has a sensor which detects the presence of a customer standing in front of it. A motor inside the display stand enables the platform to rotate either clockwise or anti-clockwise.

When the sensor is activated the motor rotates clockwise for five seconds and then stops. After a further period of four seconds the motor rotates anti-clockwise for five seconds and then stops. The process then repeats unless the customer moves away.

Complete the flow chart in **Fig. 9** to achieve this operation. [10]

Image removed due to copyright

Fig. 8

Fig. 9

10 **Fig. 10** shows a trolley which is used to transport goods and equipment.

Fig. 10

(a) State **two** design criteria which should be considered in relation to the height of the trolley.

1. _____

2. _____ [2]

(b) Mild steel was used for the frame of the trolley because it is relatively cheap and strong.

Give **two** other suitable reasons for using mild steel for the frame.

1. _____ [1]

2. _____ [1]

(c) The base of the trolley sits at right angles to the bottom of the frame.

Give **two** reasons for this design arrangement.

1. _____

_____

2. _____

_____ [2]

11 A 50 mm × 50 mm square hole is to be cut from the centre of a piece of Medium Density Fibreboard (MDF). The piece of MDF measures 150 mm × 150 mm × 6 mm.

Describe the process used to prepare and cut the 50 mm square hole in the Medium Density Fibreboard. Your answer should make reference to all hand tools and equipment that you would use to complete the task.

Make reference to any appropriate safety precautions used in this process.

[10]

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total Marks	

Examiner Number