



General Certificate of Secondary Education  
2015

Centre Number

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Candidate Number

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## Technology and Design

Unit 1:  
Technology and Design Core

MV18

[GTD11]

THURSDAY 4 JUNE, AFTERNOON

### TIME

1 hour, plus your additional time allowance.

### 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.**

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.

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 at the end of each question indicate the marks awarded to each question or part question.

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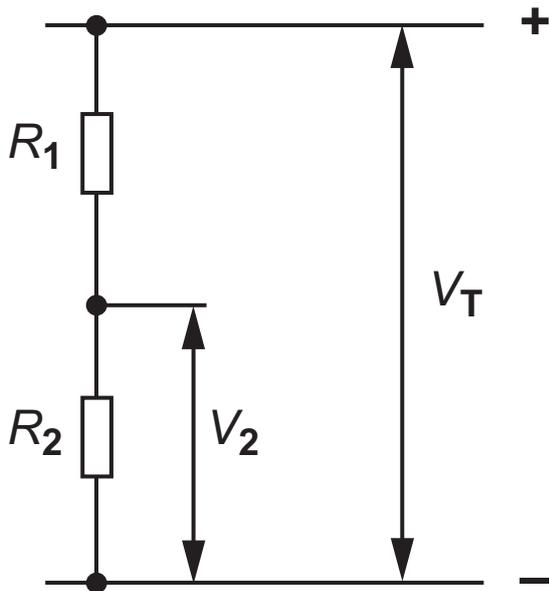
## Formulae for GCSE Technology and Design

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 For potential divider

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

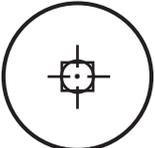


3 Series Resistors  $R_T = R_1 + R_2 + R_3$  etc

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

1 **Table 1** shows a number of different symbols. Using the first row as a guide, complete the table. [9 marks]

**Table 1**

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

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

(a) (i) What do the letters CAD stand for? [1 mark]

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(ii) What do the letters CNC stand for? [1 mark]

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

Advantage 1: [1 mark] \_\_\_\_\_

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Advantage 2: [1 mark] \_\_\_\_\_

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Disadvantage: [1 mark] \_\_\_\_\_

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

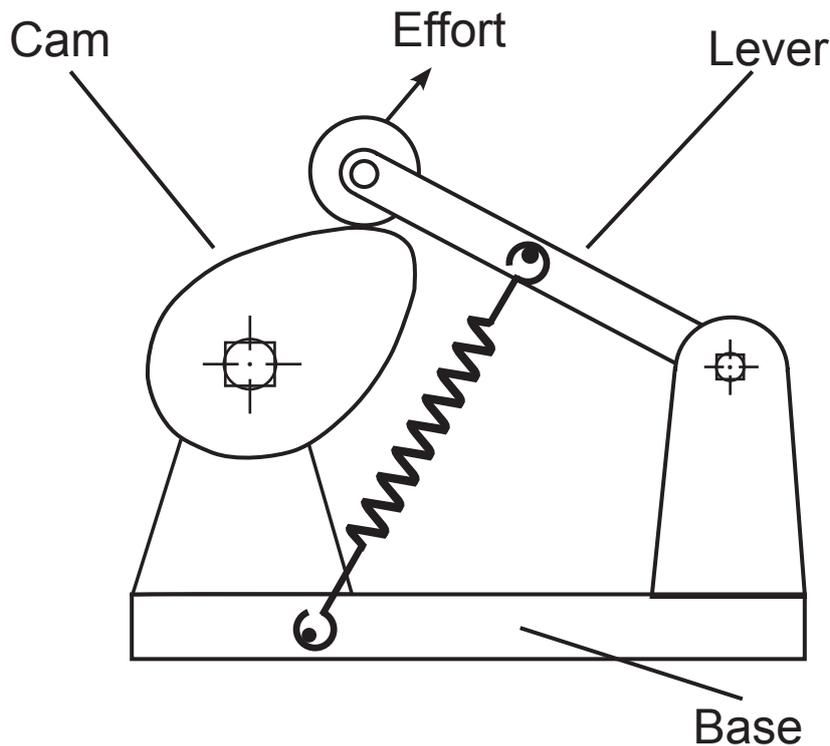


Fig. 1

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

Cam [1 mark] \_\_\_\_\_

Follower [1 mark] \_\_\_\_\_

(ii) State the type of motion of:

The cam [1 mark] \_\_\_\_\_

The lever [1 mark] \_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

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 mark for each]

1. \_\_\_\_\_

2. \_\_\_\_\_

(b) Identify **two** specific finishes that are only used on metals. [1 mark for each]

1. \_\_\_\_\_

2. \_\_\_\_\_

(c) Identify **two** specific finishes that are only used on wood. [1 mark for each]

1. \_\_\_\_\_

2. \_\_\_\_\_

(d) Identify **one** suitable finish for plastic. [1 mark]

\_\_\_\_\_

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 mark]

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(ii) What symbol is used for this electronic unit? [1 mark]

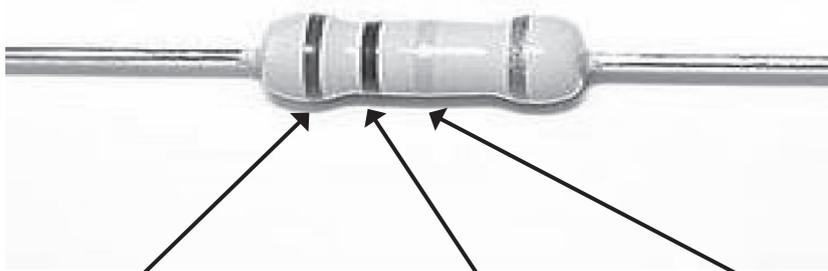
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(iii) What name is given to the electronic unit represented by the letter **I**? [1 mark]

---

(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

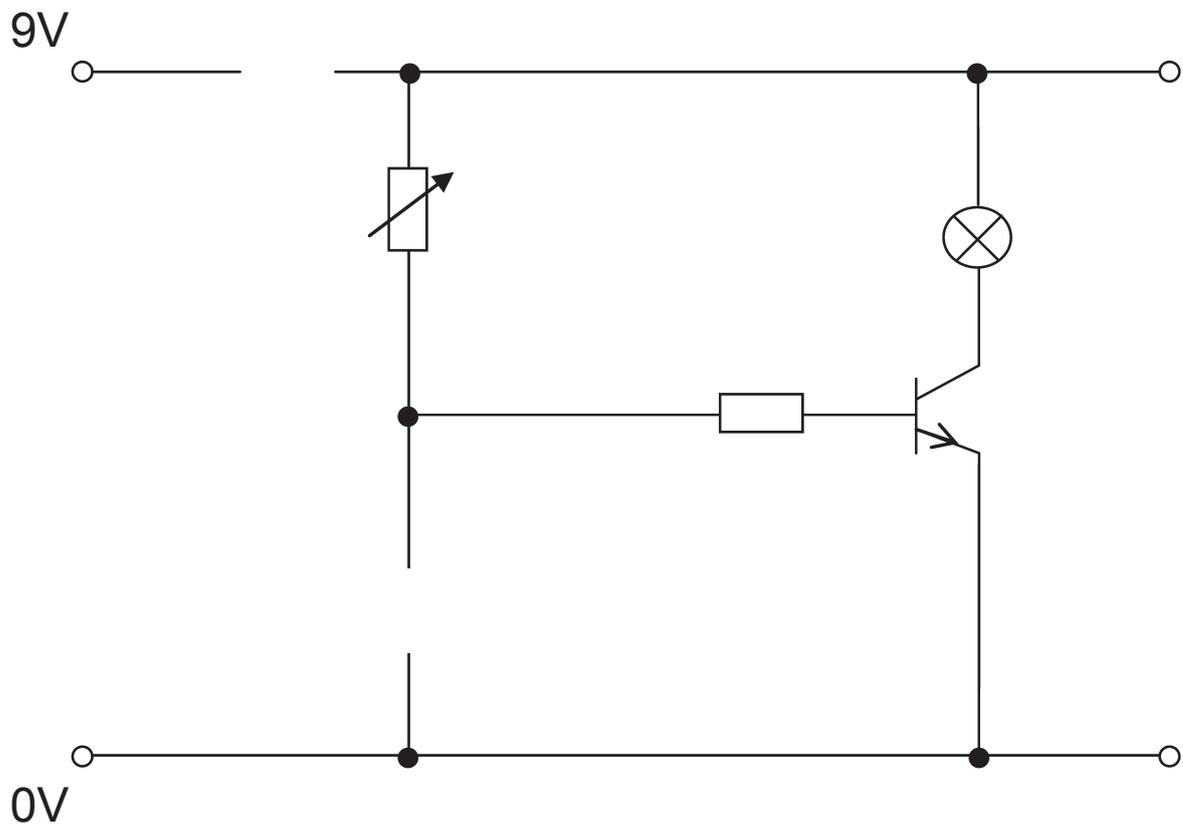


Band 1 Brown    Band 2 Black    Band 3 Orange

**Fig. 2**

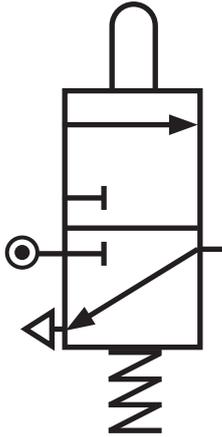
Value [3 marks] \_\_\_\_\_

- (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**. [4 marks]



**Fig. 3**

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



**Fig. 4**

(i) Name the type of valve shown in **Fig. 4**. [1 mark]

\_\_\_\_\_

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

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

Method of operation [1 mark] \_\_\_\_\_

Method of return [1 mark] \_\_\_\_\_

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

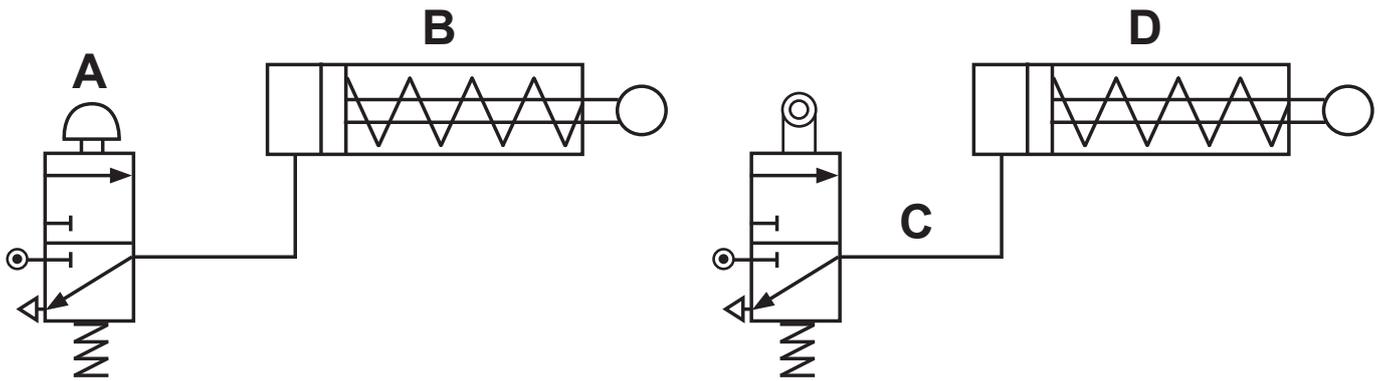


Fig. 5

Explain the operation of the circuit when:

Push-button **A** is pressed and held down. [3 marks]

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---



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---

Push-button **A** is released. [2 marks]

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



**Fig. 6**

- (i) Which category of plastic is suitable for vacuum forming the container? [1 mark]

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- (ii) Name a suitable plastic for the container. [1 mark]

---

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

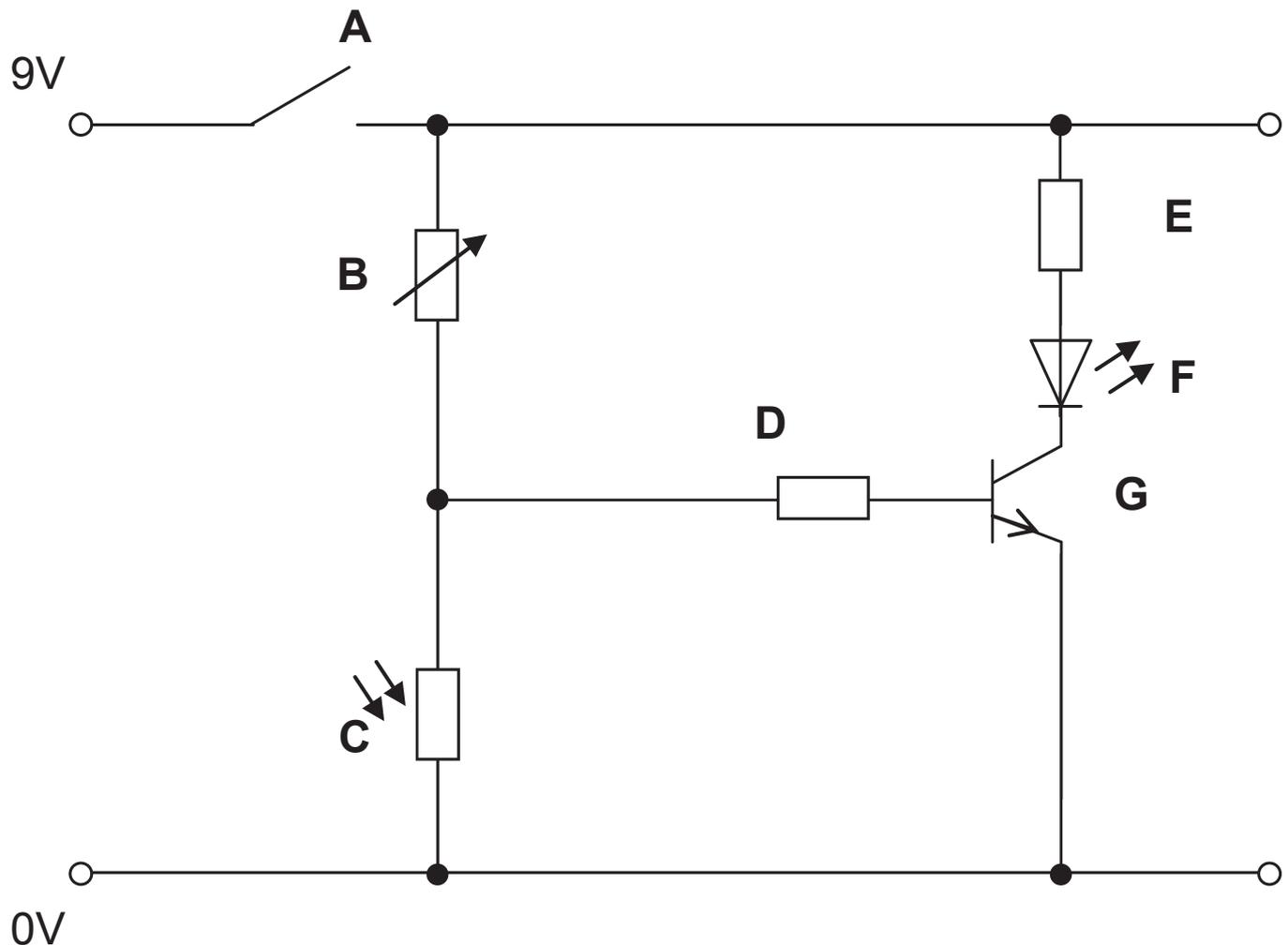
Suggest **two** reasons for this design feature. [1 mark for each]

1. \_\_\_\_\_

2. \_\_\_\_\_

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**(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** opposite 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. [6 marks]

Table 2

Component	Component Name	Input Component	Process Component	Output Component
<b>B</b>				
<b>F</b>				
<b>G</b>				

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

Component **A** [1 mark] \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Component **B** [1 mark] \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Component **C** [2 marks] \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Component **G** [2 marks] \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Component **F** [1 mark] \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- 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 marks]

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**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. [2 marks]

1. \_\_\_\_\_

\_\_\_\_\_

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 mark for each]

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

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

Give **two** reasons for this design arrangement. [2 marks]

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_









**SOURCES**

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Fig.1....."Modular Courses in Technology: Mechanisms", Schools Council, Pearson Education Limited © Schools Council 1981

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Q7.....Source: Chief Examiner

Fig.7.....© CCEA

Q9.....<http://www.tomtop.com/media/catalog/product/cache/1/image/ced77cb19565515451b3578a3bc0ea5e/h/8/h8736-11-2779.jpg>

Fig.10.....@JimMills/Hemera/Thinkstock

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Question Number	Marks
1	
2	
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10	
11	
<b>Total Marks</b>	

Examiner Number

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