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Candidate Number

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General Certificate of Secondary Education  
2011

**Technology and Design**

Unit 1:  
Technology and Design Core

[GTD11]



WEDNESDAY 25 MAY, AFTERNOON

**TIME**

1 hour.

**INSTRUCTIONS TO CANDIDATES**

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

Write your answers in the spaces provided in this question paper.

Answer **all eleven** questions.

On **page 3** we have provided formulae for you to use with this paper.

**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.

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



**PLEASE NOTE:**

On **page 3** we have provided formulae  
for you to use with this paper.

Questions for this paper begin on **page 4**.

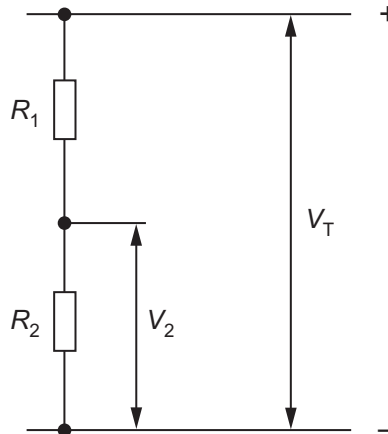
## Formulae for GCSE Technology and Design

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  $R_T = R_1 + R_2 + R_3 \text{ etc}$

Parallel Resistors  $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$  or  $R_T = \frac{R_1 \times R_2}{R_1 + R_2}$

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

For a compound gear train:

Total Gear ratio = the product of the gear ratios of all the subsystems

i.e.  $GR_T = GR_1 \times GR_2 \times GR_3 \dots$

5 Mechanical Advantage =  $\frac{\text{Load}}{\text{Effort}}$

6 Velocity Ratio =  $\frac{\text{Distance moved by effort}}{\text{Distance moved by load}}$




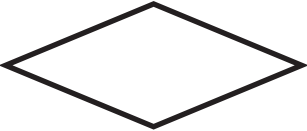


7 Pneumatics

Force = Pressure  $\times$  Area ( $F = P \times A$ )

8 Time Constant  $T = R \times C$

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
		LED
		
		Flammable
	Computer Control	
	Electronic	
		

[9]

Examiner Only	
Marks	Remark



3 Fig. 2 shows a cam and follower.

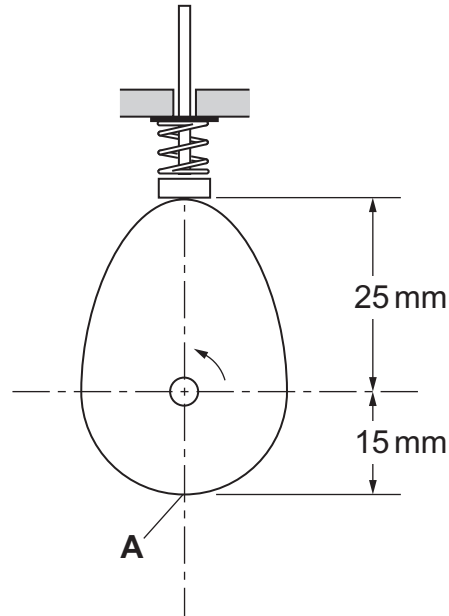


Fig. 2

(i) Select a word from the list below to describe the motion of the follower.

- Reciprocating      Linear      Rotary      Oscillating**

\_\_\_\_\_ [1]

(ii) Which component produces the output motion?

\_\_\_\_\_ [1]

(iii) Select the correct name for the cam from the following.

- Eccentric      Heart shaped      Pear shaped**

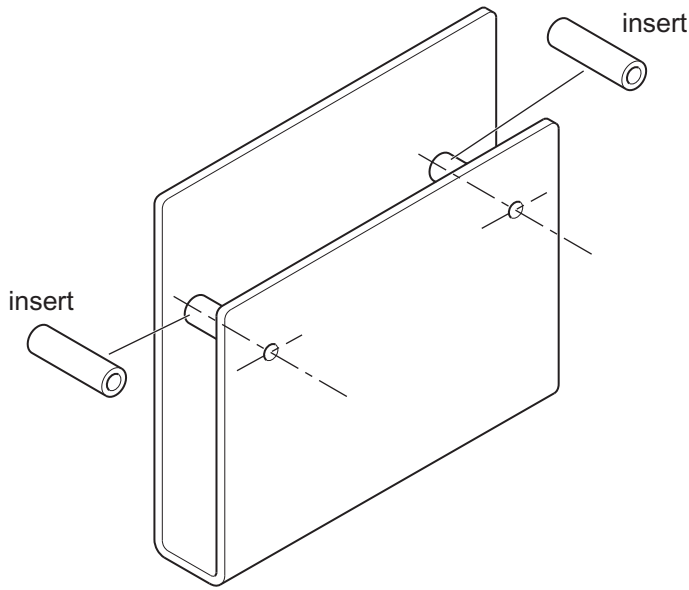
\_\_\_\_\_ [1]

(iv) The cam turns until the point **A** is in contact with the follower. Determine the direction and distance moved by the follower.

\_\_\_\_\_  
 \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

- 4 **Fig. 3** shows a plastic holder for leaflets in a library. The holder is attached to a wooden notice board using screws which pass through the inserts.



**Fig. 3**

- (i) State **one** specification point which should be considered in designing the leaflet holder.

\_\_\_\_\_ [1]

- (ii) Suggest a suitable plastic material for the holder and give **one** reason for your choice.

Material \_\_\_\_\_

Reason \_\_\_\_\_ [2]

- (iii) **What equipment** would be used to bend the material into the shape illustrated in **Fig. 3**?

\_\_\_\_\_  
 \_\_\_\_\_ [2]






- (iv) Give **one** reason for using inserts as shown in **Fig. 3**.

Reason \_\_\_\_\_ [2]

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Marks	Remark

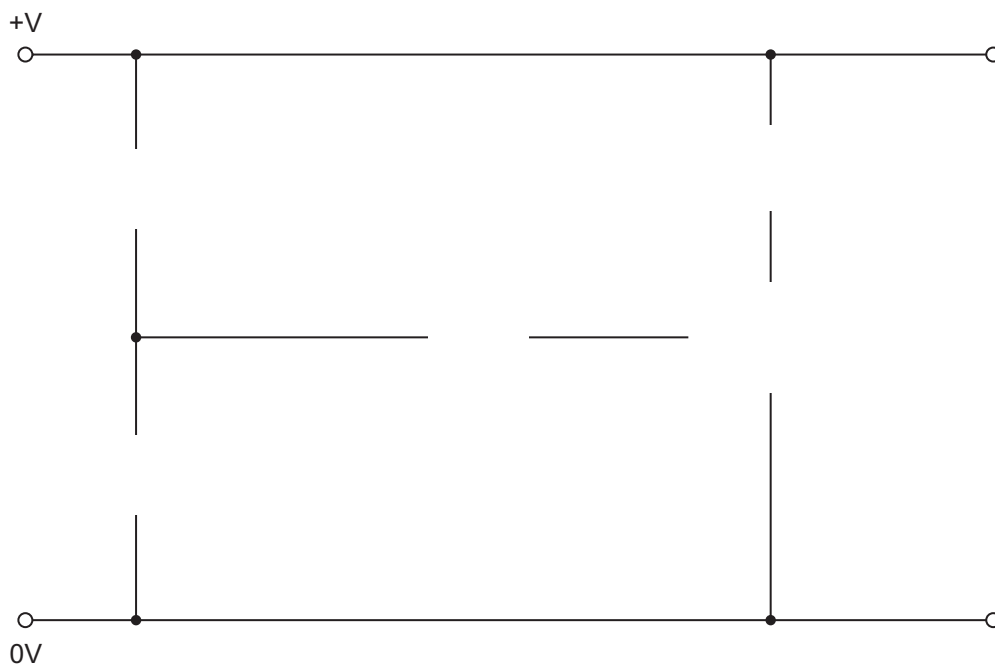
- 5 (a) **Table 2** shows five electronic circuit symbols. Name the four remaining electronic circuit symbols in **Table 2** below.

**Table 2**

				
BULB				

[4]

- (b) Insert **all five** symbols, shown in **Table 2**, into the part completed circuit diagram (**Fig. 4**) illustrated below. When the diagram is complete the bulb should switch on when there is a change in temperature.



**Fig. 4**

[5]

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Marks	Remark







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**(Questions continue overleaf)**

6 (a) Table 3 shows the symbols for methods of operation of valves.

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Marks	Remark

Table 3

Symbol	Name of symbol
	
	
	
	

Complete Table 3 by inserting the correct name for each symbol from Table 4.

Table 4

Plunger
Roller trip
Lever
Push button

[4]

(b) Fig. 5 shows part of a pneumatic circuit which is used to apply brakes to a wheel.

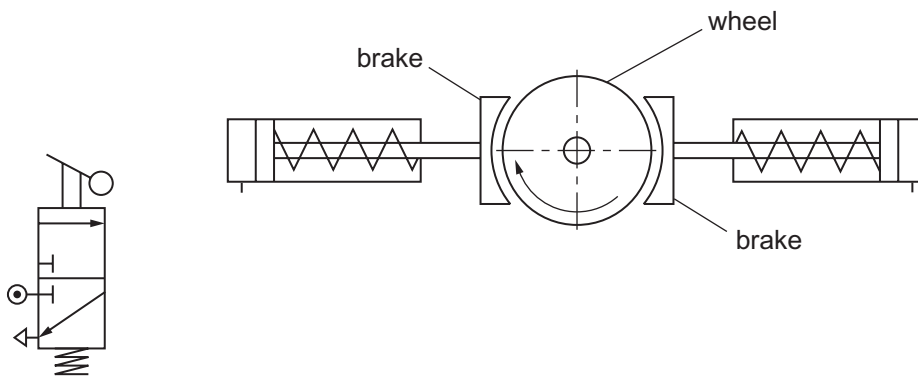


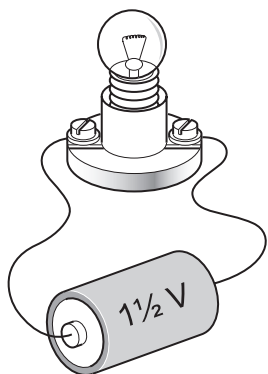
Fig. 5

Complete Fig. 5 to show how the brakes could be applied.

[3]



8 (a) Two basic circuit drawings are shown in Fig. 7 and Fig. 8 below.



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Fig. 7

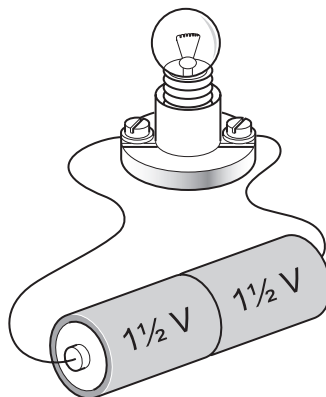


Fig. 8

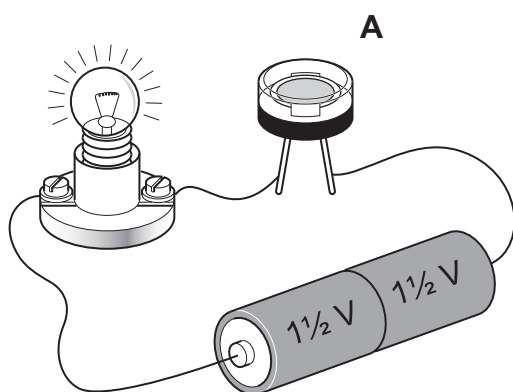
(i) Which circuit bulb would you expect to glow brighter?

\_\_\_\_\_ [1]

(ii) Explain your answer.

\_\_\_\_\_  
 \_\_\_\_\_ [2]

(b) Fig. 9 shows a slightly modified version of the circuit shown in Fig. 8.



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Fig. 9

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Marks	Remark





(b) The program in question 9(a) is to be changed so that when the sensor is covered motor A comes on for 3 seconds.

Then motor B comes on to rotate the other eye for 3 seconds. The program then stops.

Complete the flowchart in Fig. 12 to show this process.

[7]

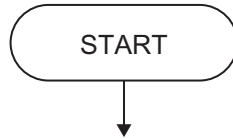


Fig. 12

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Marks	Remark











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