



Rewarding Learning

General Certificate of Secondary Education  
2014

Centre Number

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Candidate Number

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## Technology and Design

Unit 1: Technology and  
Design Core



[GTD11]

FRIDAY 23 MAY, AFTERNOON

\*GTD11\*

### 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.

Questions which require drawing or sketching should be completed using an HB pencil. All other questions must be completed in blue or black ink. **Do not write 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.

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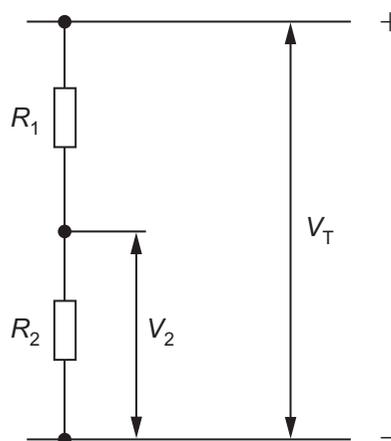
## Formulae for GCSE Technology and Design

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

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

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- 3 Fig. 2 shows a belt and pulley system which is used to transmit power from a motor to a machine pulley.

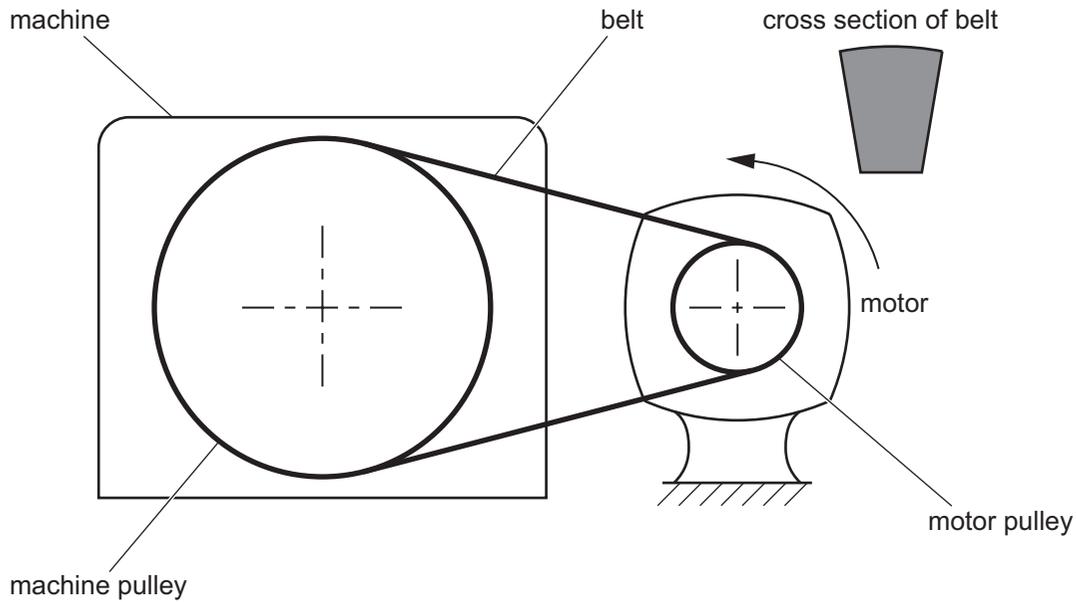


Fig. 2

- (i) Name the type of belt shown. [1]
- \_\_\_\_\_
- (ii) State the type of motion at the machine pulley. [1]
- \_\_\_\_\_
- (iii) Name **one** other method which could be used to transmit power from the motor to the machine. [1]
- \_\_\_\_\_
- (iv) Mark on **Fig. 2** the direction of motion of the machine pulley. [1]
- (v) Suggest how the system could be modified to give a slower output speed for the same motor speed. [2]
- \_\_\_\_\_
- \_\_\_\_\_

Examiner Only

Marks Remark

Total Question 3





4 Plastics can be separated into two main types: thermoplastic and thermosetting.

(i) Outline the main difference between the two types of plastic.

Thermoplastic \_\_\_\_\_  
 \_\_\_\_\_  
 Thermosetting \_\_\_\_\_  
 \_\_\_\_\_ [2]

(ii) Table 2 shows a list of plastic materials.

Complete Table 2 by inserting a tick (✓) in the appropriate column to show if the material is thermosetting or thermoplastic.

Table 2

Material	Thermosetting	Thermoplastic
Acrylic		
Melamine		
Polyester resin		
Rigid polystyrene		

[4]

(iii) Which one of the above materials would be suitable for a kitchen worktop surface?

Give a reason for your choice.

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

Examiner Only	
Marks	Remark
Total Question 4	

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5 The symbols for **two** electronic components are shown in **Fig. 3** below.

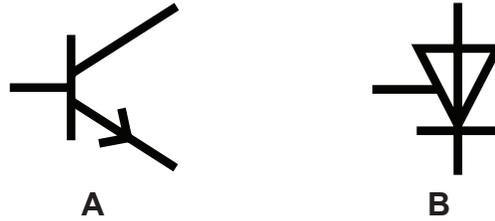


Fig. 3

(a) (i) Name each of the electronic symbols shown in **Fig. 3**.

Symbol **A** \_\_\_\_\_

Symbol **B** \_\_\_\_\_ [2]

(ii) Label or mark on either symbol an **X** to show the input leg of the component. [1]

(iii) For the component symbol that you have selected name the input leg. [1]

\_\_\_\_\_

(iv) Component **A** requires a minimum input voltage to operate. The voltage required falls within one of the three voltage ranges shown below.

Select the voltage range in which the input leg will operate.

0.1V–0.3V

0.35V–0.55V

0.6V–0.8V

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

Examiner Only

Marks Remark









- 7 Fig. 5 A and B show sketches of two possible moulds to be used in a vacuum forming process.

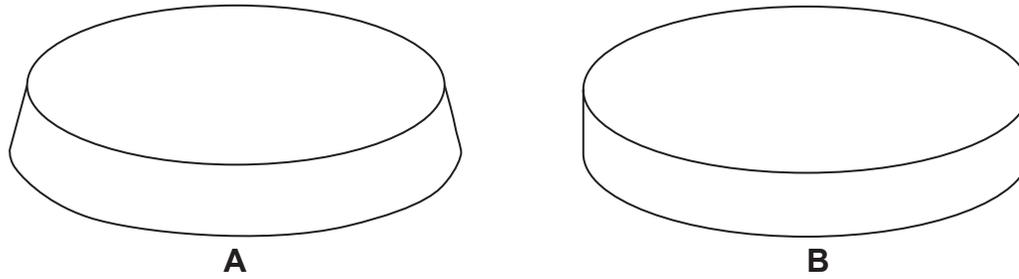


Fig. 5

- (a) Explain why mould A was selected in preference to mould B.

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

- (b) MDF was used to manufacture the mould in preference to mahogany.

- (i) What does MDF stand for?

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

- (ii) Other than cost, why would MDF be used in preference to mahogany?

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

Examiner Only

Marks Remark





8 (a) Name **three** tools or items of equipment that may be used when constructing an electronic circuit on a printed circuit board.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_ [3]

(b) A list of electronic components is shown below. Select the six components required, in addition to a buzzer, to build a circuit that would operate a buzzer when the temperature is high. The circuit should include a potential divider.

Use a tick (✓) to show your choice of six components.

List of electronic components

- |  |                                      |
|--|--------------------------------------|
| <input type="checkbox"/> Variable resistor | <input type="checkbox"/> Diode       |
| <input type="checkbox"/> LED               | <input type="checkbox"/> Bulb        |
| <input type="checkbox"/> Motor             | <input type="checkbox"/> Transistor  |
| <input type="checkbox"/> Thermistor        | <input type="checkbox"/> Resistor    |
| <input type="checkbox"/> LDR               | <input type="checkbox"/> SPST switch |
| <input type="checkbox"/> Battery           |                                      |

[6]

Examiner Only	
Marks	Remark



(c) In the space below produce a neat diagram of the potential divider part of the circuit needed to operate the buzzer.

[2]

Examiner Only	
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Total Question 8	

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- 9 Fig. 6 shows a sketch of an egg timer which is programmed to operate in a specific sequence.

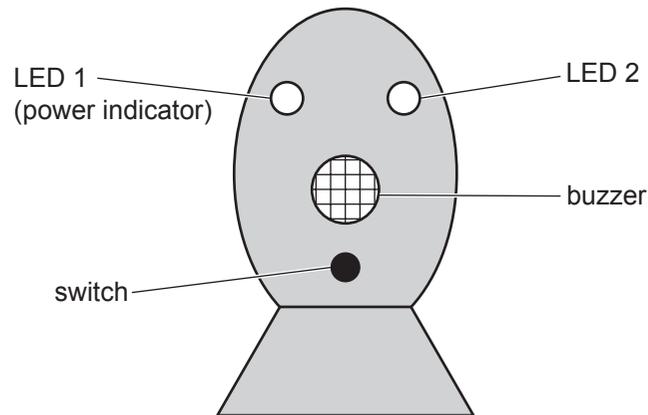


Fig. 6

When the switch is operated, LED 1 will light up and remain on. This is the power indicator for the egg timer. The egg timer will run for 3 minutes. At the end of the 3 minutes LED 2 and the buzzer will both come on for 10 seconds to give a visual and audible signal that the timer has stopped. LED 2 and the buzzer will then turn off. This process will repeat unless the egg timer is turned off by the switch which will stop the process.

Examiner Only

Marks Remark





10 A designer has developed a pump for inflating tyres. A sketch of the pump is shown in Fig. 8.

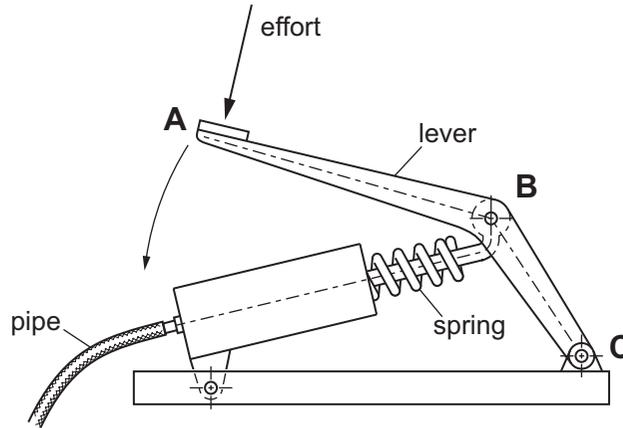


Fig. 8

(a) Outline **two** specification points the designer would have considered in the design of this pump.

1. \_\_\_\_\_  
\_\_\_\_\_
  2. \_\_\_\_\_  
\_\_\_\_\_
- [2]

(b) The pump is operated by applying an effort to **A**.

(i) State the class of lever shown.

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

(ii) Suggest a suitable material for the lever and give a reason for your answer.

Lever material \_\_\_\_\_ [1]

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

Examiner Only	
Marks	Remark



(c) The design of the pump is to be changed by making the link **A B** longer.

Suggest what effect this change will have on:

- The size of the effort required.

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

- The distance moved by the effort.

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

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Total Question 10	

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Question Number	Marks
1	
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11	

<b>Total Marks</b>	
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Examiner Number

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