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**General Certificate of Secondary Education** 2014

# **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.

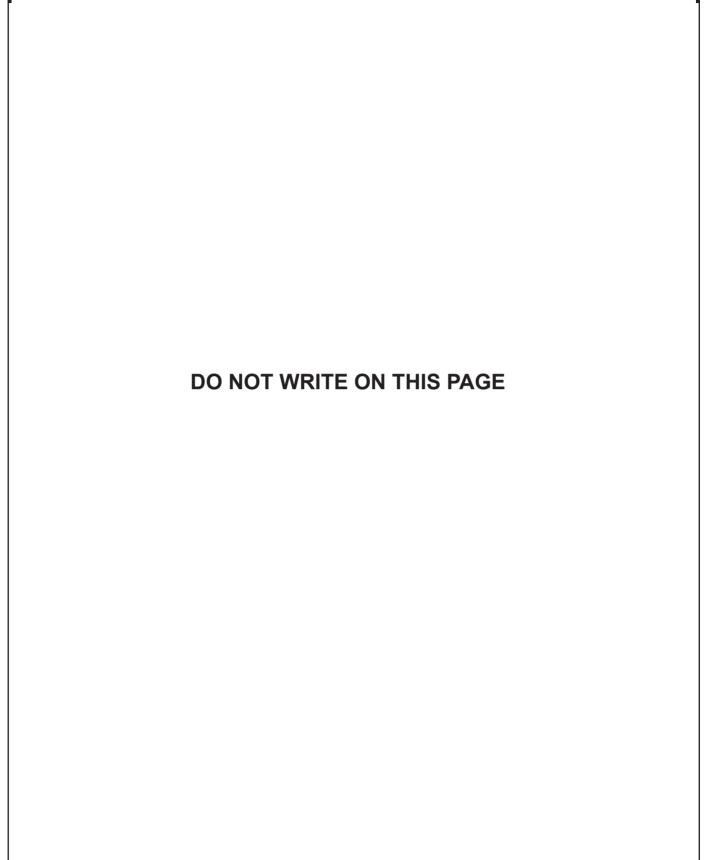
Quality of written communication will be assessed in Question 11.

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

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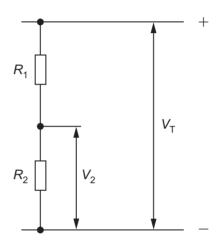
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Figure 1 Company 1 Company

$$V_2 = \frac{R_2}{R_1 + R_2} \times V_{\mathsf{T}}$$



- 3 Series Resistors  $R_{\rm T} = R_{\rm 1} + R_{\rm 2} + R_{\rm 3}$  etc
- 4 Gear ratio of a simple gear train =  $\frac{\text{number of teeth on driven gear}}{\text{number of teeth on driver gear}}$

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Table 1 shows a number of different symbols. Using the first row as a Examiner Only Marks Remark guide, complete the table. Table 1 **Sketch of Symbol** Type of Symbol Name of Symbol Bulb Electronic Electronic Variable resistor Mechanical Hazard © Crown copyright Light dependent resistor

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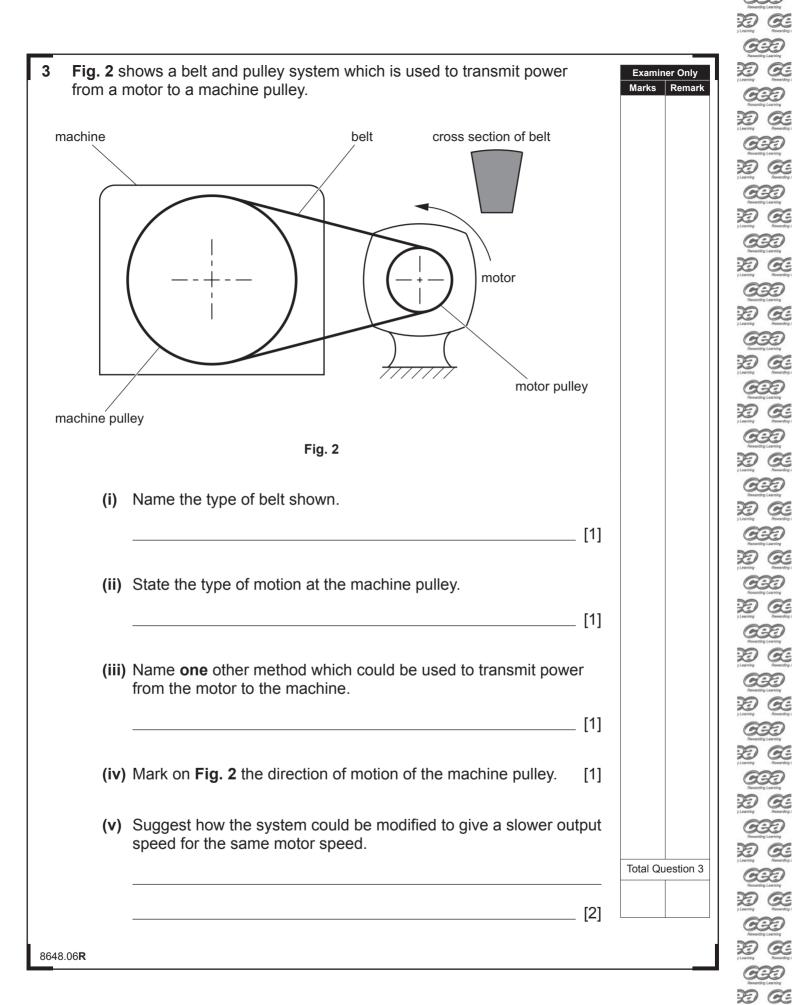
	<b>Fig. 1</b> shows an aluminium bracket which a company is going to produce using a computer aided manufacturing process.	Exami Marks
	Fig. 1	
	<ul> <li>(a) There are two general stages in the computer aided manufacturing (CAM) process:</li> <li>Generation of a file</li> <li>Manufacturing the product</li> </ul>	
	(i) How is a file generated?	
	(ii) What CAM process is used to manufacture the product?  [1]	
	(b) Give one advantage and one disadvantage of using a CAM process compared to a manufacturing process that does not use CAM. Advantage:	
	Disadvantage: [2]	
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4		stics can be separa	ated into two main types: tl	nermoplastic and	Examiner Only  Marks Remark
	(i)	Outline the main of	lifference between the two	types of plastic.	
		Thermoplastic			
		Thermosetting			
				[2]	
	(ii)	Table 2 shows a li	st of plastic materials.		
			by inserting a tick (✓) in the last is thermosetting or therror		
			Table 2		
		Material	Thermosetting	Thermoplastic	
A	crylic	;			
М	elam	ine			
Р	olyes	eter resin			
R	igid p	oolystyrene			
				[4]	
	(iii)	Which <b>one</b> of the worktop surface?	above materials would be	suitable for a kitchen	
		Give a reason for	your choice.		
		Material			
		Reason		[2]	
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		A	Fig. 3	<b>Y</b> -	
(a)	(i)	Name each of the	e electronic symbols sh	own in <b>Fig. 3</b> .	
		Symbol A			
		Symbol <b>B</b>			[2]
	(ii)	Label or mark on component.	either symbol an <b>X</b> to	show the input leg of	the [1]
	(iii)	For the compone leg.	nt symbol that you hav	e selected name the	input
					[1]
	(iv)		quires a minimum inputired falls within one of t		ges
		Select the voltage	e range in which the in	out leg will operate.	
		0.1 V-0.3 V	0.35 V-0.55 V	0.6 V-0.8 V	
					[1]

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			[2]		
	(ii)	A protective resistor is generally used with either component. Redraw either component to include its protective resistor.			
			[2]		
		Component B			
		Component A			
(k	o) (i)	Both components are used as electronic switches. Outline the switching operation of each component.		Examir Marks	ner Only Remark

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(a) Name each of the following pneumatic symbols: Examiner Only Marks Remark (iii) (b) Fig. 4 shows a pneumatic circuit which operates a press. Fig. 4 (i) State the type of logic connection for valves A and B. \_\_\_\_ [1] (ii) Suggest a reason for using this type of connection. \_\_\_\_\_[1]

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Parametring Learning  Discovering  Learning  Resourcing  COST		State the <b>two</b> methods which could be used to operate the cylinder.		Examin Marks	er Only Remark
Powersking Learning  A Learning  Revearching I		Method 1			
COD Recording Learning		Method 2	[2]		
y Learning Researching I			- L-J		
D CE 7 Learning Rewarding I	(iv)	Explain why valve <b>C</b> is necessary in the circuit.			
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		<b>A</b> and <b>B</b> show sketches of two possible moulds to be used in a m forming process.	Examiner Only Marks Remark
		A B	
		Fig. 5	
(6	<b>a)</b> Ex	xplain why mould <b>A</b> was selected in preference to mould <b>B</b> .	
	_	[1]	
(1	<b>b)</b> M	DF was used to manufacture the mould in preference to mahogany.	
	(i)	) What does MDF stand for?	
		[1]	
	(ii	i) Other than cost, why would MDF be used in preference to mahogany?	
		[1]	
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	(c)	When mould <b>A</b> was used for vacuum forming there was difficulty removing it from the formed plastic.	Exami Marks	ner Only Remark
		Suggest <b>two</b> changes or improvements to the mould to overcome this problem.		
		Change 1		
		[1]		
		Change 2		
		[1]		
			Total Q	uestion 7
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8	(a)	Name <b>three</b> tools or items of equipment that may be used when constructing an electronic circuit on a printed circuit board.		Examiner Only  Marks Remark
		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		
		Variable resistor Diode		
		LED Bulb		
		Motor Transistor		
		Thermistor Resistor		
		LDR SPST switch		
		Battery	[6]	
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<del>-</del> GG3 20 GE GG3 20 GE (c) In the space below produce a neat diagram of the potential divider Examiner Only Marks Remark part of the circuit needed to operate the buzzer. GET 20 00 633 RO GE 693 20 06 G93 PO GE GG3 RO GE GGE E GE GG3 [2] 20 GG GGT DO GE 693 DO GE G33 DO CE GGGD GE GEE DO CE G G G G DO CE G33 DO CE 693 PO GE CO3 DO GE Total Question 8 GGDDO CE GEE [Turn over E CE 8648.06**R** G93 DO GE GGG

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



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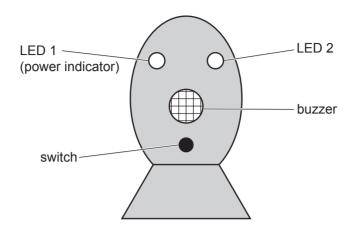
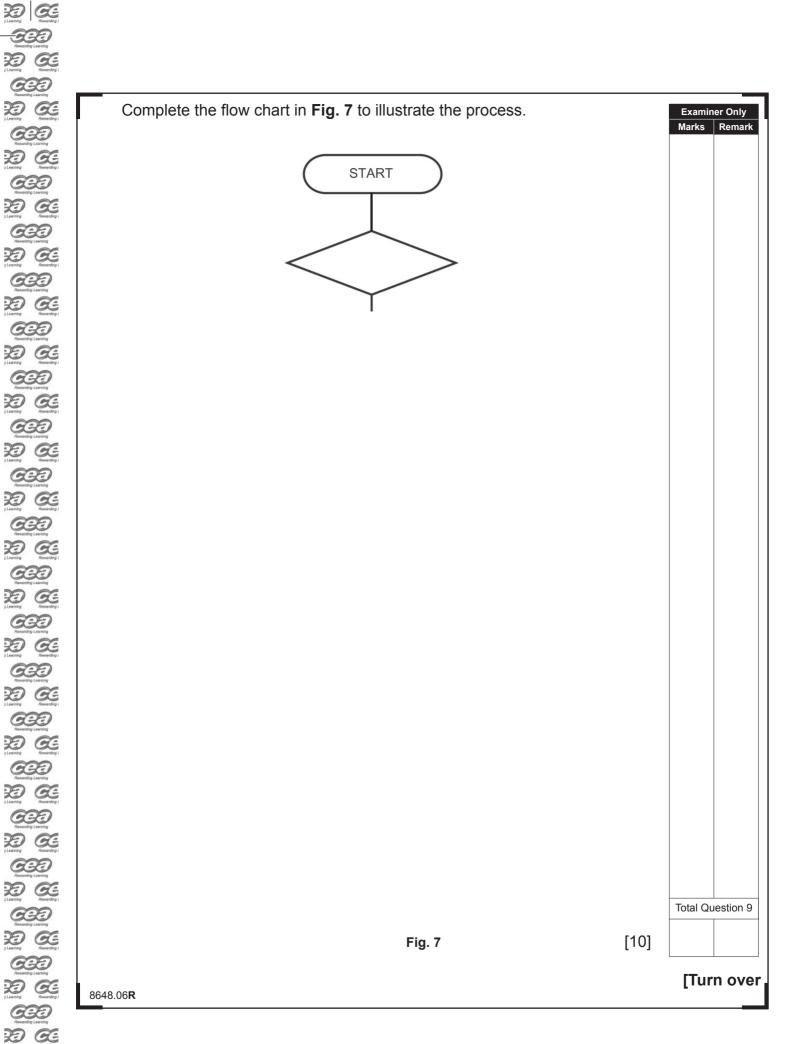


Fig. 6

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.

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10		gner has developed a pump for inflating tyres. A sketch of the pump wn in <b>Fig. 8</b> .	Examiner Only  Marks Remark
		pipe spring C	
		utline <b>two</b> specification points the designer would have considered	
	in	the design of this pump.	
	1.		
	2.		
		[2]	
	<b>(b)</b> Th	ne pump is operated by applying an effort to <b>A</b> .	
	(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]	
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(c)	The design of the pump is to be changed by making the link <b>A B</b> longer.		Examiner Marks R
	Suggest what effect this change will have on:		
	The size of the effort required.		
	The distance moved by the effort	[1]	
	The distance moved by the effort.	[4]	
		[1]	
			Total Ques
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11	The manufacture of plastic key fobs in a school workshop involves a number of procedures.	Examine Marks I	Remark
	Describe the overall process giving the names of tools, equipment and machines needed to cut, shape, file, smooth and polish an oval shaped		
	key fob made from acrylic.		
	Make reference to any appropriate safety precautions used in this process.		
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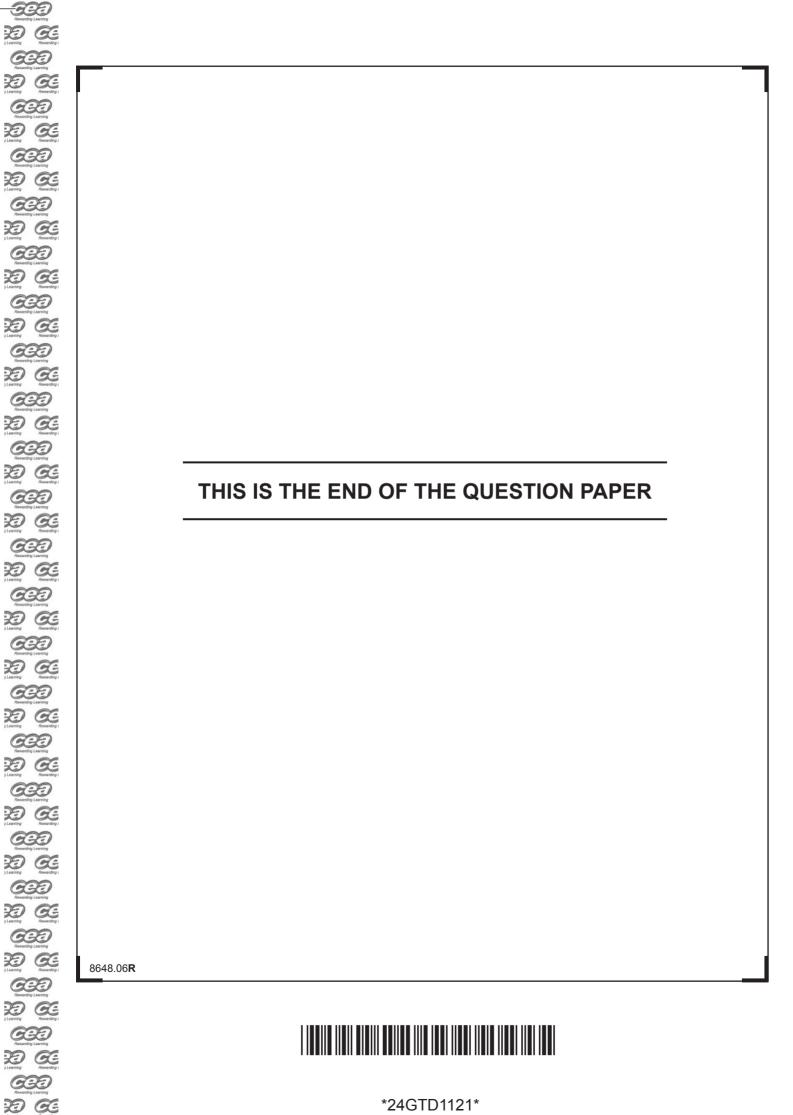
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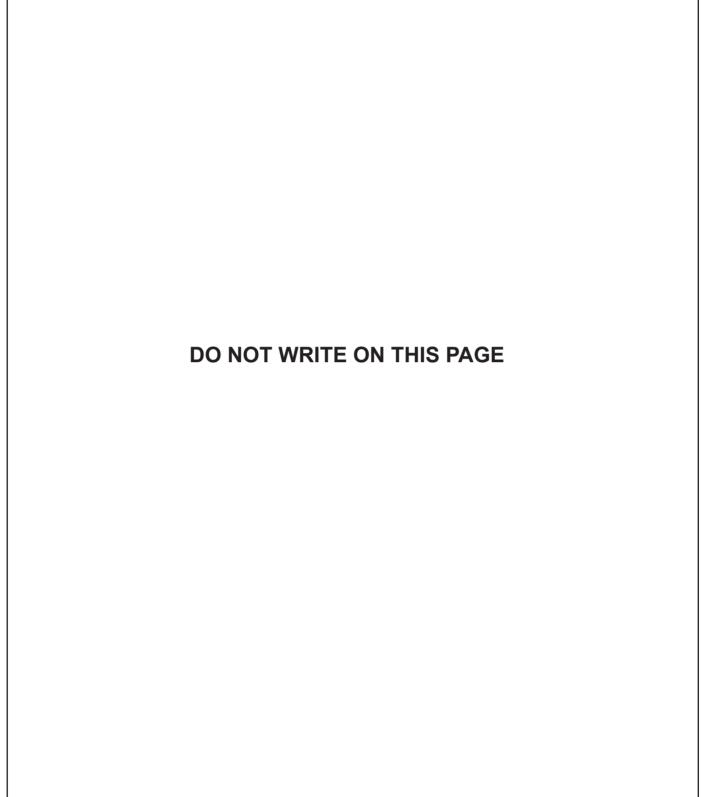
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**Total Marks** 

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