

Write your name here

Surname

Other names

Pearson
Edexcel GCSE

Centre Number

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Candidate Number

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Design and Technology:
Electronic Products
Unit 2: Knowledge and Understanding of Electronic Products

Friday 23 May 2014 – Afternoon
Time: 1 hour 30 minutes

Paper Reference

5EP02/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches it must be dark (HB or B). Coloured pens, pencils and highlighter pens must **not** be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
– *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*
- You may use a calculator.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL the questions.

For each question 1 to 10, choose an answer A, B, C or D. Put a cross in the box indicating the answer you have chosen . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

1 The letters PCB stand for:

- A** primary circuit breaker
- B** printed circuit board
- C** prototyping copper block
- D** positive conducting bars

(Total for Question 1 = 1 mark)

2 Which of the following metals is attracted to a magnet?

- A** aluminium
- B** brass
- C** copper
- D** mild steel

(Total for Question 2 = 1 mark)

3 Resistors are used to:

- A** store current
- B** amplify current
- C** measure current
- D** restrict current

(Total for Question 3 = 1 mark)

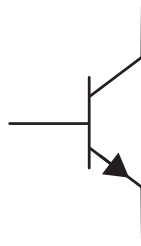
4 The legs of a transistor are called base, collector and:

- A** emitter
- B** anode
- C** cathode
- D** radiator

(Total for Question 4 = 1 mark)



5 Identify the circuit symbol below.



- A timer
- B operational amplifier
- C logic gate
- D transistor

(Total for Question 5 = 1 mark)

6 Name the component shown in this picture.



(Source: © Digi-key corporation)

- A reed switch
- B slide switch
- C micro switch
- D tilt switch

(Total for Question 6 = 1 mark)




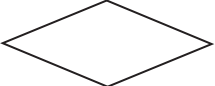


7 Which **one** of the following would be used to measure a battery to see if it is fully charged?

- A ammeter
- B voltmeter
- C capacitance meter
- D ohmmeter

(Total for Question 7 = 1 mark)

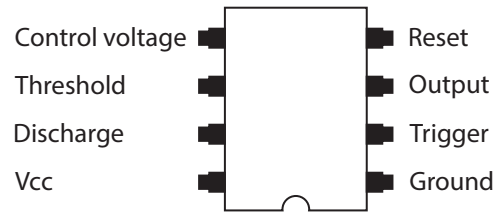
8 Which **one** of the following flowchart symbols is used to show a decision?

- A 
- B 
- C 
- D 

(Total for Question 8 = 1 mark)



9 Identify pin 1 of this 555 timer.



- A Ground
- B Vcc
- C Reset
- D Control voltage

(Total for Question 9 = 1 mark)

10 Which **one** of the following logic gates gives the truth table shown below?

Input 1	Input 2	Output
0	0	1
0	1	1
1	0	1
1	1	0

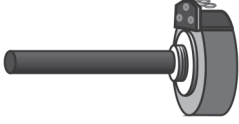
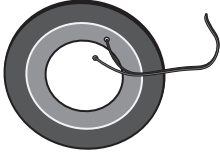

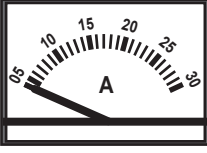
- A AND
- B OR
- C NAND
- D NOR

(Total for Question 10 = 1 mark)



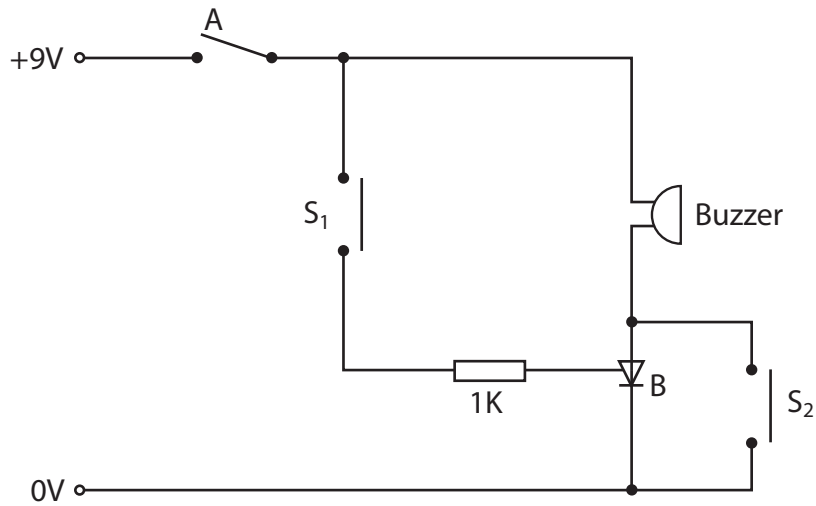
11 (a) The table below shows some equipment and components.

Complete the table below by giving the missing names and uses.

Equipment/Component	Name	Use
	Variable resistor	(1)
	Piezo-electric sensor	(1)
		For sensing light levels (1)
		To measure current (1)



The circuit diagram below shows a simple shed door alarm.



(b) Name components A and B. (2)

A

B

(c) Name the type of switch used in this circuit as S_1 and S_2 . (1)

.....

(d) State how the buzzer behaves when switch S_1 is pressed and then released.

(i) When it is pressed (1)

.....

(ii) When it is released (1)

.....

(e) Explain the function of S_2 in the circuit. (2)

.....

.....

.....

.....



(f) Explain **two** advantages of using a buzzer rather than a loudspeaker.

(4)

Advantage 1

.....

.....

Advantage 2

.....

.....

(g) The circuit designer wishes to change the circuit in order to reduce its environmental impact.

Name a power supply that would be more environmentally friendly than disposable batteries and give a reason for your choice.

(2)

Name

.....

Reason

.....

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(h) The case of the alarm will be injection moulded.

Explain why this is a suitable manufacturing process for the case.

(2)

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(Total for Question 11 = 19 marks)



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12 Many parents are concerned about how much time their children spend playing computer games. You have been asked to design a one-off prototype for a computer game timer that will tell a child when to stop playing.

Design the **casing** only. Do **not** design any circuits.

The specification for the computer game timer is that it must:

- have a computer theme
- be adjustable for different time periods
- have a warning method when time is up
- have a suitable power supply
- be able to be attached to and removed from the computer
- have a method of accessing the circuit for maintenance
- be made of a material suitable for a prototype
- be made using process(es) suitable for prototype manufacture.

In the spaces opposite, use sketches and, where appropriate, brief notes to show **two different** design ideas for the computer game timer that meet the specification points above.

Candidates are reminded that if a pencil is used for diagrams/sketches it must be dark (HB or B).

Coloured pens, pencils and highlighter pens must **not** be used.

PLEASE DO NOT WRITE OR DRAW IN THIS SPACE.

PLEASE USE THE SPACES OPPOSITE FOR YOUR DESIGNS.



Design idea 1

(8)

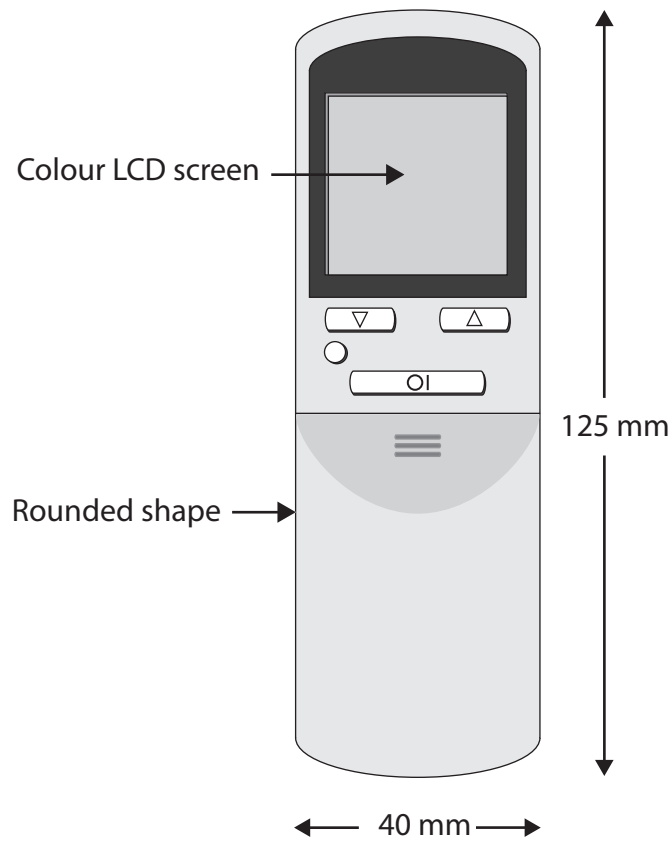
Design idea 2

(8)

(Total for Question 12 = 16 marks)



13 The picture below shows a remote control handset. It is used to control a projector through a wireless link.



(a) Explain how the handset is successful in meeting the following specification point:
It fits comfortably into the user's hand.

(2)

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(b) Explain **two** advantages of using an LCD screen for the handset.

(4)

Advantage 1

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Advantage 2

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.....



Computer integrated manufacture (CIM) includes the use of Computer-aided design (CAD) and Computer-aided manufacture (CAM).

(c) Explain **two** advantages of using CAD and/or CAM for designing and manufacturing the remote control handset.

(4)

Advantage 1

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Advantage 2

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*(d) Evaluate high impact polystyrene (HIPS) against aluminium in terms of performance requirements and sustainability for the manufacture of the handset case.

(6)

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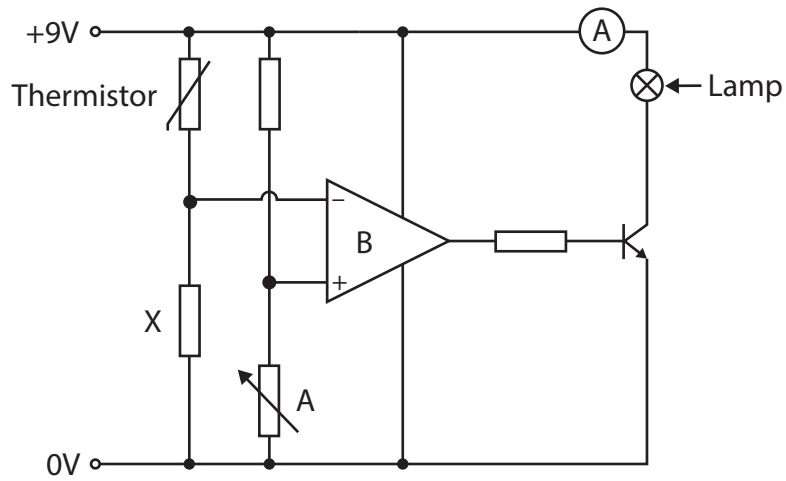
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(Total for Question 13 = 16 marks)



14 The circuit diagram below shows how a lamp can be switched on and off.



(a) Name component X.

(1)

(b) Explain the function of a thermistor.

(2)

(c) Referring to its two inputs, describe how the operational amplifier (Op-Amp) works as a comparator.

(3)



(d) This circuit switches the light on at low temperatures.

Explain how the lamp could be made to come on at high temperatures.

(2)

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(e) Explain the function of the transistor in this circuit.

(2)

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(f) The ammeter in the circuit reads 0.25A.

Calculate the resistance of the lamp using Ohm's Law $V = I \times R$.

Assume the transistor has zero resistance.

(3)

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..... Ohms



