

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
Paper 2: Knowledge and Understanding
of Electronic Products

Tuesday 19 May 2015 – Morning
Time: 1 hour 30 minutes

Paper Reference

5EP02/01

You may use a calculator.

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.*

Advice

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

Turn over ►

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Answer ALL questions.

Some questions must be answered with a cross in a box ☒. 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 symbol below means:



- A** eye protection must be worn
- B** eye protection is available
- C** good vision essential
- D** wear sunglasses

(Total for Question 1 = 1 mark)

2 The letter 'L' in LCD stands for:

- A** laminated
- B** light
- C** low energy
- D** liquid

(Total for Question 2 = 1 mark)

3 A dry joint means that:

- A** the solder is still molten
- B** the joint has not been soldered
- C** the joint is poorly soldered
- D** the joint needs to be wiped clean

(Total for Question 3 = 1 mark)



4 Which **one** of the following drill sizes would be used when drilling holes for a resistor in a printed circuit board?

- A 0.1mm
- B 0.5mm
- C 1.0mm
- D 2.0mm

(Total for Question 4 = 1 mark)

5 The legs on an NPN transistor are base, emitter and:

- A conductor
- B collector
- C cathode
- D current

(Total for Question 5 = 1 mark)

6 Which **one** of the following colours is used to show the tolerance of a resistor?

- A black
- B grey
- C gold
- D white

(Total for Question 6 = 1 mark)

7 A diode can protect against:

- A back EMF
- B ultraviolet light
- C low current
- D excessive voltage

(Total for Question 7 = 1 mark)



8 The Kyoto Protocol aims to reduce:

- A greenhouse gasses
- B roadside litter
- C landfill refuse
- D unsorted waste

(Total for Question 8 = 1 mark)

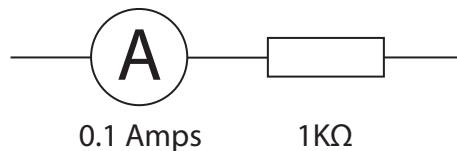
9 Two $2.2\text{K}\Omega$ resistors are connected in parallel. The total resistance due to these resistors is:

- A unknown; more information is required
- B below $2.2\text{K}\Omega$
- C $2.2\text{K}\Omega$
- D above $2.2\text{K}\Omega$

(Total for Question 9 = 1 mark)

10 What is the voltage across the resistor shown below?

You may use the equation $V=IR$



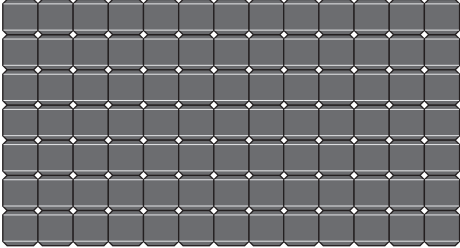
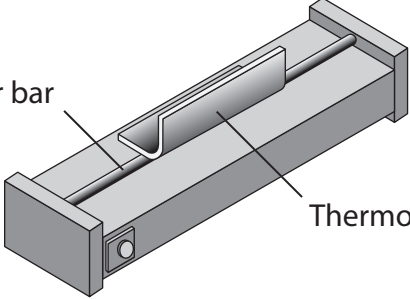
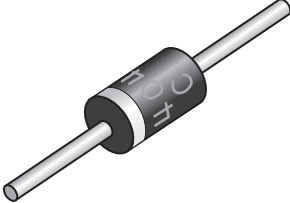
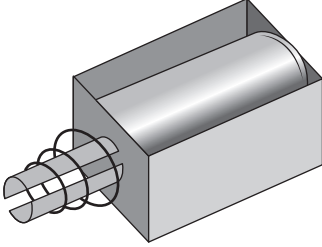
- A 0.1 volt
- B 1.0 volt
- C 10 volts
- D 100 volts

(Total for Question 10 = 1 mark)



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

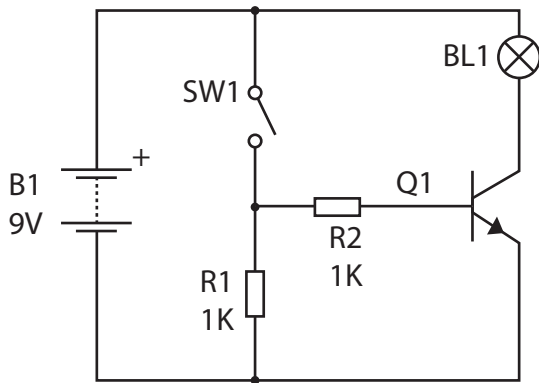
Complete the table by giving the missing names and uses.

Equipment/Component	Name	Use
	Photovoltaic cell	(1)
 <p>Heater bar</p> <p>Thermoplastic</p>	Line bender	(1)
		Allows current to flow in one direction only (1)
		Converts electric current to straight line movement (1)

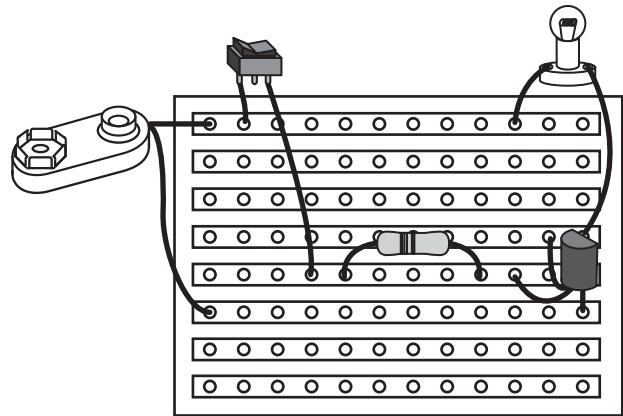


(b) A student is making a simple electronic circuit.

The drawings below show a circuit diagram and an incomplete stripboard (veroboard) prototype circuit for a lamp.



Circuit diagram



Stripboard circuit

- (i) Draw R1 in the correct position on the stripboard circuit. (2)
- (ii) Draw an X on the stripboard circuit to show where a track should be broken so the circuit will work correctly. (1)
- (iii) Give **one** advantage of using PCB design software rather than drawing circuits by hand. (1)



12 Lots of motorists find it difficult to park in their garage without driving into the end wall.

You have been asked to design a car parking sensor that will tell the driver when to stop.

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

The specification for the car parking sensor is that it must:

- have a 'motoring' theme
- have an on/off switch
- sense the position of the car electronically
- have a visual warning
- have an audible warning
- have a suitable power supply
- be made from a material that will not damage the car
- be securely sealed so it can't be opened by children

In the spaces opposite, use sketches and, where appropriate, brief notes to show **two different** design ideas for the car parking sensor 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)

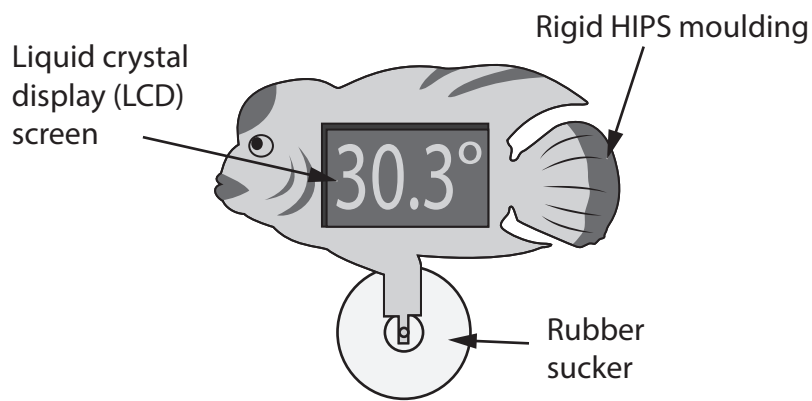
Design idea 2

(8)

(Total for question 12 = 16 marks)



13 The picture below shows a thermometer designed to go inside a fish tank.



(a) Describe how the thermometer is successful in meeting the following specification points.

(i) It is easy to read the temperature.

(2)

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.....

.....

.....

(ii) It can be securely fixed to the fish tank.

(2)

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(b) Explain **two** advantages of using watch batteries for the thermometer.

(4)

1

.....

.....

2

.....

.....

(c) The thermometer is designed so it can be taken apart when it is no longer needed.

Explain why it is important to be able to disassemble products at the end of their lives.

(2)

.....

.....

.....



14 (a) A company wishes to manufacture and sell an automatic greenhouse watering system. It is considering using internet marketing.

(i) State the meaning of the term 'internet marketing'.

(1)

(ii) Explain **one** advantage and **one** disadvantage of internet marketing for the company.

(4)

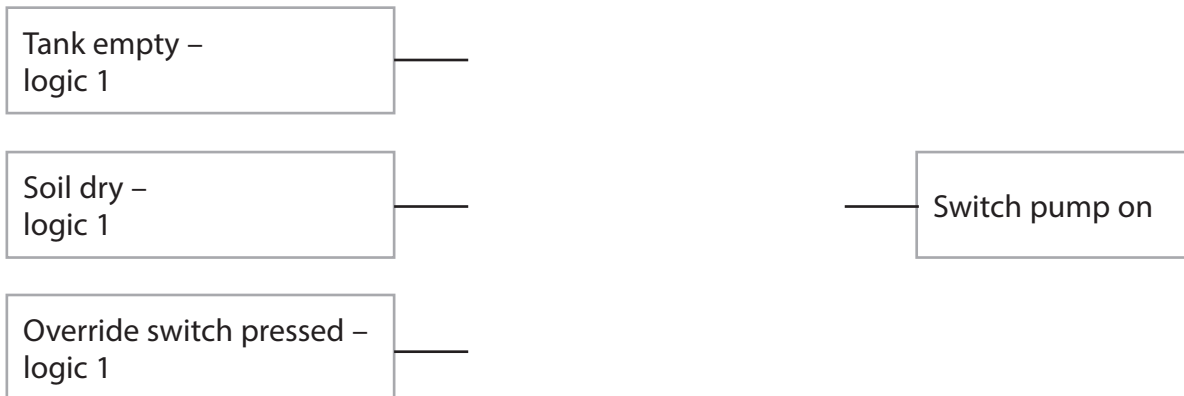
Advantage

Disadvantage

The automatic greenhouse watering system will switch on a pump when the soil is dry and the water tank contains water, or when an 'override' switch is pressed.

(b) Add **three** logic gate symbols to the block diagram below to make the automatic greenhouse watering system work correctly.

(4)



(c) (i) Describe how a 555 timer circuit could be used to allow the pump to operate for a fixed period of time.

(2)

.....

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.....

.....

(ii) State which **two** components could control how long the 555 timer circuit would keep the pump on for.

(2)

Component 1

Component 2



*(d) Compare the use of logic gates with PICs in control circuits.

(6)

Area with horizontal dotted lines for writing the answer.

(Total for Question 14 = 19 marks)

TOTAL FOR PAPER = 80 MARKS



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