

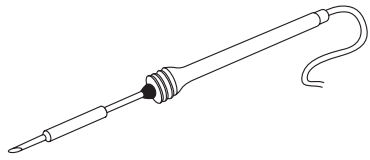
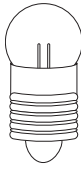
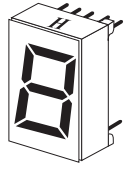
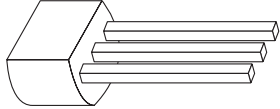
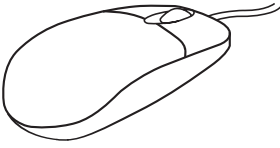
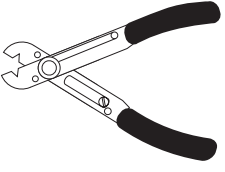
Answer ALL the questions. Write your answers in the spaces provided.

1. The table below shows some tools, equipment and components used in the making of electronic circuits.

(a) Complete the table by:

- (i) naming each tool, piece of equipment or component
- (ii) describing its use

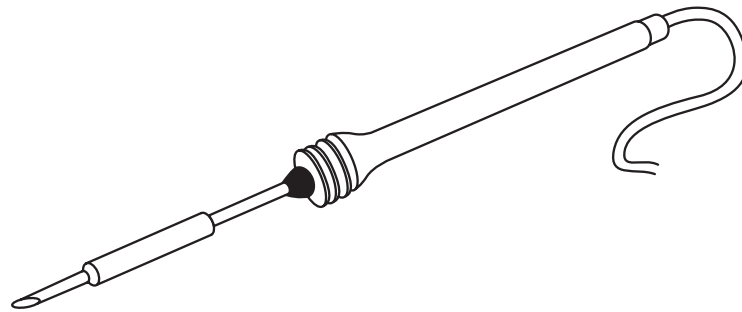
The first one is done for you.

Tool/Equipment/Component	Name	Use
	Soldering iron	Hot joins components
		
		
		
		
		

(10)



(b) The drawing below shows a soldering iron.



(i) One safety measure to be taken when using a soldering iron is to use a soldering iron stand.

Give **two** different safety measures that should be taken when using a soldering iron.

1

2

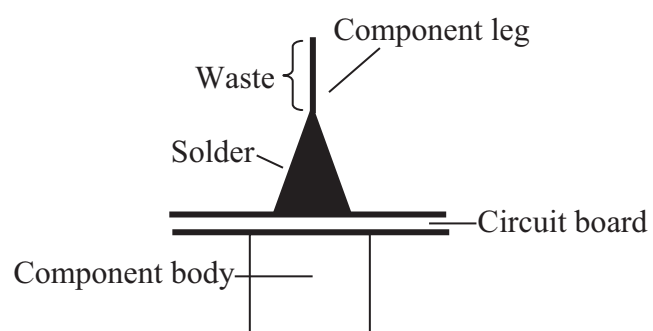
(2)

(ii) Give **one** reason for using a soldering iron stand when soldering.

.....

(1)

(c) The drawing below shows the side view of a component soldered to a circuit board.



Describe how the waste of the component leg, as shown in the diagram, should be removed.

.....

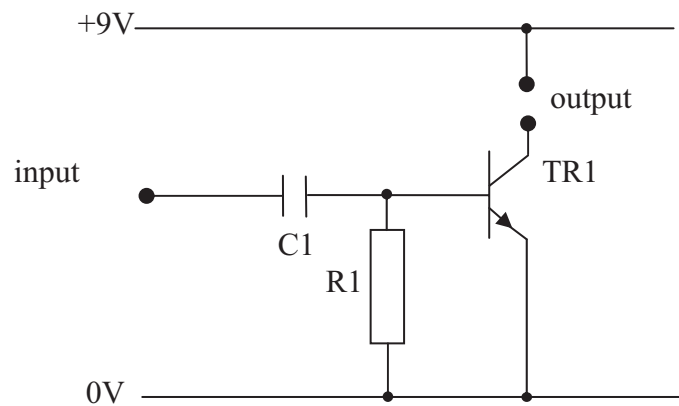
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(2)



Leave blank

(d) The diagram below shows a basic time delay circuit that is to be produced in high volume.



From the list below complete the sentences.

- | | | |
|------------------------|------------------|---------------------------|
| batch | prototype | injection moulding |
| production line | PCB | |

Each term can be used **once** or **not at all**.

1. A time delay circuit must be made so that it may be tested before high volume manufacture begins.
 2. A computer program can be used to design the onto which the components are soldered.
 3. To make the time delay circuit in high volume a needs to be set up.
- (3)**

(e) The time delay circuit is to be manufactured in high volume.

Give **two** advantages for using computer testing of each time delay circuit.

- 1
 - 2
- (2)**

(f) Electronic circuit designs may be found on the internet.

Describe **one** way that the design for an alternative time delay circuit may be found on the internet.

.....

.....

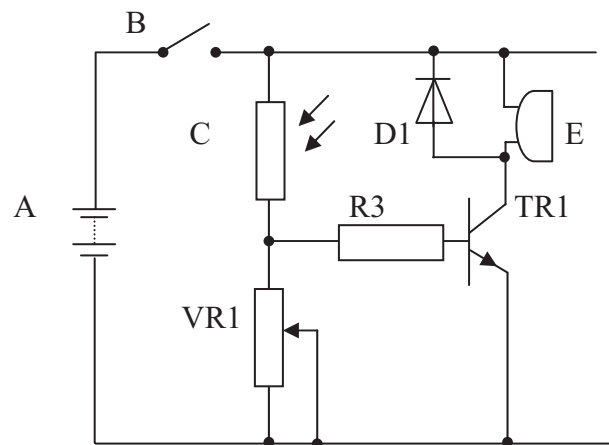
(2)

Q1

(Total 22 marks)



2. The diagram below shows a simple locker alarm.



(a) Name components A, B, C and E.

- A
- B
- C
- E

(4)

(b) Give **one** reason for using R3 in the circuit.

.....

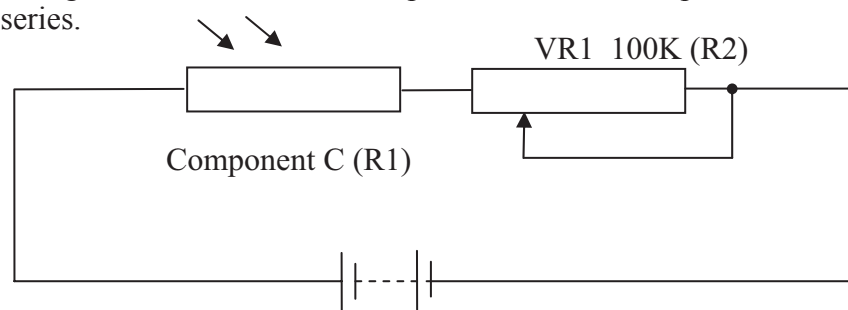
(1)

(c) Give **one** reason for using VR1 in the circuit.

.....

(1)

(d) The diagram below shows the simplified circuit of component C and VR1 connected in series.



If the resistance of component C is 800K and VR1 is adjusted to its maximum value, calculate their combined resistance.
Use the formula: $R_{total} = R_1 + R_2$

..... K
(1)



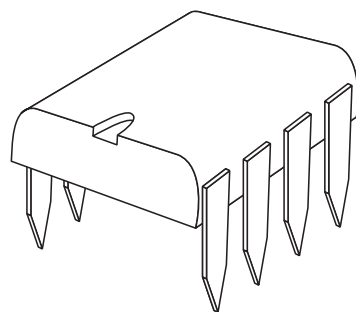
(e) Describe the action of the circuit when the base of the transistor passes the switch-on voltage.

.....
.....
(2)

(f) Explain **one** reason for using the diode (D1) in the circuit.

.....
.....
(2)

(g) PCBs for commercial products are batch produced. These PCBs can use many transistors or dedicated integrated circuits (ICs). The drawing below shows an 8 pin dedicated IC.



(i) Give **three** advantages of using dedicated ICs rather than transistors for complex circuits.

1
2
3
(3)

(ii) Explain **one** disadvantage of using ICs rather than transistors for **simple** circuits.

.....
.....
(2)



Leave
blank

(h) Computer aided manufacture (CAM) could be used to manufacture complex circuits.

Give **two** reasons for using CAM to manufacture complex circuits.

1

2

(2)

(i) When electronic products stop working they are often more expensive to repair than replace.

(i) Give **two** disadvantages of throwing away broken electronic products.

1

2

(2)

(ii) Describe **one** way that electronic products can be recycled.

.....

.....

(2)

Q2

(Total 22 marks)

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Leave
blank

3. A company is designing a handheld emergency alarm.

The company requires a case to be designed for the handheld emergency alarm.

The specification for the emergency alarm case is that it must:

- fit easily into a small adult hand
- have a quick way of switching on the power
- allow a high volume sound output to attract attention
- be made from materials and processes suitable for batch production

(a) In the spaces opposite, use sketches and, where necessary, brief notes to show two **different** design ideas for the emergency alarm case which meet this specification.

Do not evaluate your designs in part (a).

Candidates are reminded that if pencil is used for diagrams/sketches that it is dark (HB or B). Coloured pens, pencils and highlighter pens must **not** be used.

Please do not write in the space below. Please write your answers in the spaces provided opposite.





Leave
blank

Design Idea 1

(8)

Design Idea 2

(8)



N 2 5 8 5 1 A 0 9 1 6

9

Turn over



Leave blank

(b) Three of the original specification points are repeated below.

Evaluate how **one** of your design ideas succeeds or fails to meet each of these specification points.

Write down the number of your chosen design idea (1 or 2) here

(i) The emergency alarm case must fit easily into a small adult hand.

.....
.....
.....

(2)

(ii) The emergency alarm case must have a quick way of switching on the power.

.....
.....
.....

(2)

(iii) The emergency alarm case must be made from materials and processes suitable for batch production.

.....
.....
.....

(2)

Q3

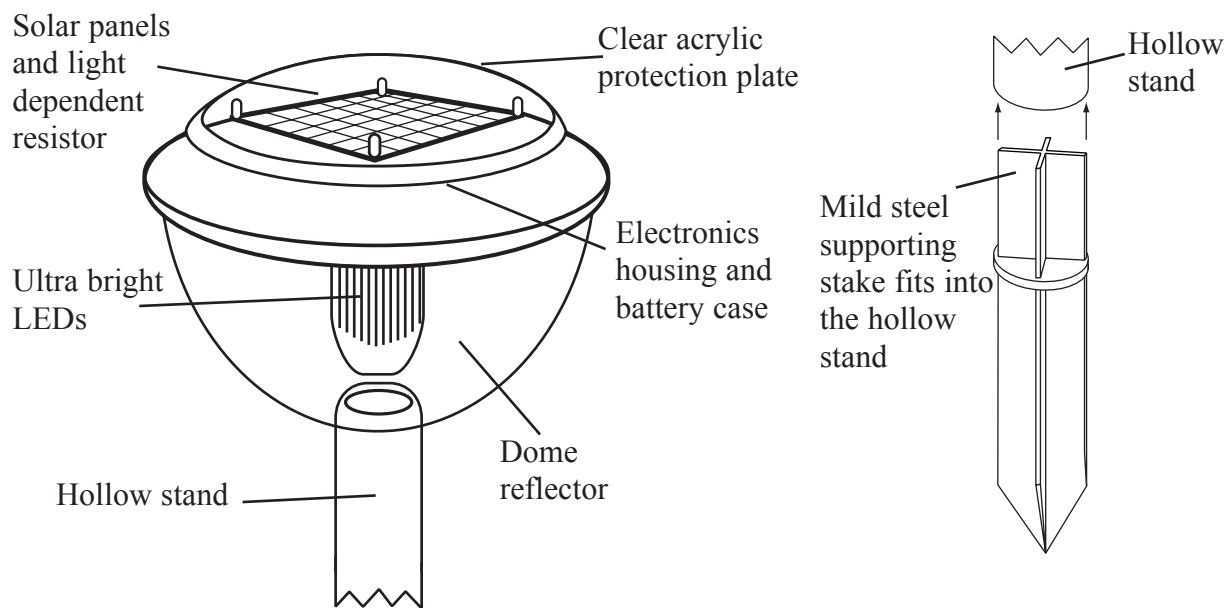
(Total 22 marks)



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4. The drawings below show details of a garden lamp. It is powered by solar energy and has a supporting metal stake.



(a) Two specification points for the garden lamp are that it must:

- automatically turn on when it is dark
- be able to be installed anywhere in a garden

Under each of the following headings, give **one** more specification point which should be included in the specification for the garden lamp.

For each point, give **one** reason why it should be included.

Market

Point

Reason

.....

.....

Quality

Point

Reason

.....

.....



Environment

Point

Reason

.....

.....

(6)

(b) The reflecting dome of the garden lamp is made from clear acrylic. It is waterproof.

Give **two** other reasons why clear acrylic is a suitable material from which to make the reflecting dome.

1

2

(2)

(c) The reflecting dome is manufactured by blow moulding.

Give **two** reasons why blow moulding is a suitable process to manufacture the reflecting dome.

1

2

(2)

(d) The electronics housing and battery case is made from rigid polystyrene using injection moulding.

Give **two** properties of rigid polystyrene that make it suitable for the electronic housing and battery case.

For each property give **one** reason why it makes rigid polystyrene suitable.

Property 1

Reason

Property 2

Reason

(4)



Leave blank

(e) The electronic housing and battery case is made using black polystyrene.

Explain **one** reason, other than looks, why black polystyrene is used to make the electronic housing and battery case.

.....

.....

(2)

(f) The mild steel supporting stake for the garden lamp is finished using plastic dip coating.

Explain **one** reason why plastic dip coating is used to finish the supporting stake.

.....

.....

(2)

(g) Two purposes of the garden lamp are that it must:

- automatically turn on when it is dark
- be able to be installed anywhere in a garden

Explain, under the following headings, how the garden lamp achieves these purposes.

(i) Automatically turn on when it is dark.

.....

.....

.....

(2)

(ii) Be able to be installed anywhere in a garden.

.....

.....

.....

(2)

Q4

(Total 22 marks)

TOTAL FOR PAPER: 88 MARKS

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