Write your name here

Surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number | | | | | |

Candidate Number | | | | |

Design and Technology

Component 1

Sample assessment material for first teaching
September 2017
Time: 1 hour 45 minutes

Paper Reference
1DT0/1D

You must have:
a calculator, ruler and pencil

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **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.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

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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Pearson

SECTION A – CORE

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

1 (a) The materials that products are made from are chosen because of their characteristics.

Figure 1 shows a table of products.

For each of the products shown, give a property of the material it is made from that makes the material suitable for the product.

The first one has been done for you.

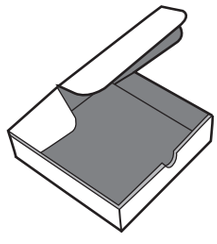
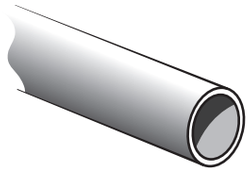
Picture of Product	Description of product	Property
	Urea formaldehyde mains voltage plug	Insulator of electricity
	A beech chopping board	**(1)** (i) .....
	Wool socks	**(1)** (ii) .....
	A corrugated board pizza box	**(1)** (iii) .....
	Copper plumbing pipe	**(1)** (iv) .....

Figure 1

(b) Mains electricity in the UK is supplied at 230 V.

Explain **one** disadvantage of mains electricity.

(2)

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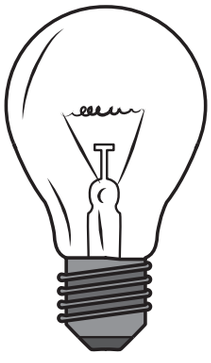
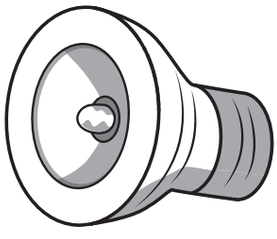
(c) Figure 2 shows a table of average daily costs related to running two types of light bulb.



Traditional filament bulb



LED Bulb

Bulb type	Average daily cost (Pence)
Traditional filament bulb	5.69 p
LED bulb	1.12 p

Figure 2

Calculate the percentage daily cost saving of using an LED bulb instead of a traditional filament bulb.

Give your answer to the nearest whole number.

(2)

Answer: .....

(Total for Question 1 = 8 marks)

2 Figure 3 shows a drawing of a mechanical toy that uses a cam.

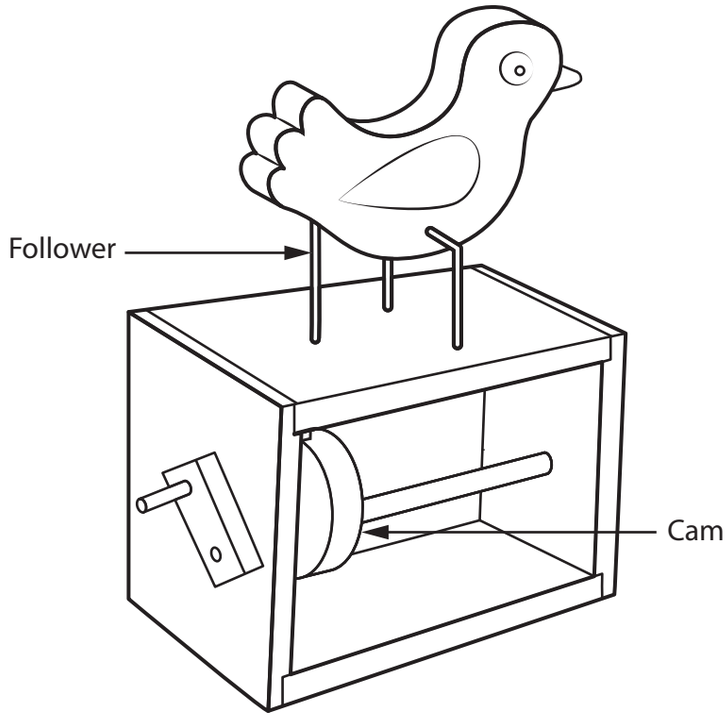


Figure 3

(a) (i) Name the type of cam shown in Figure 4.

(1)

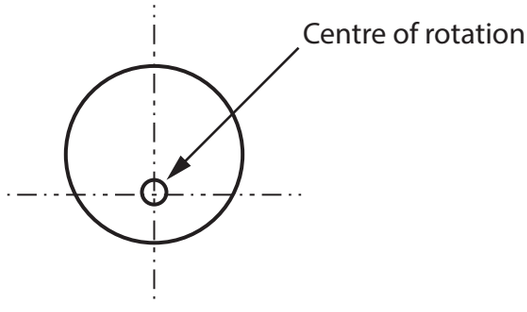


Figure 4

Type of cam:

.....

(ii) Describe the movement of the bird in Figure 3 as the cam rotates.

(2)

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(iii) Describe the effect on the movement of the bird if the cam shown in Figure 3 is replaced by a drop (snail) cam.

(2)

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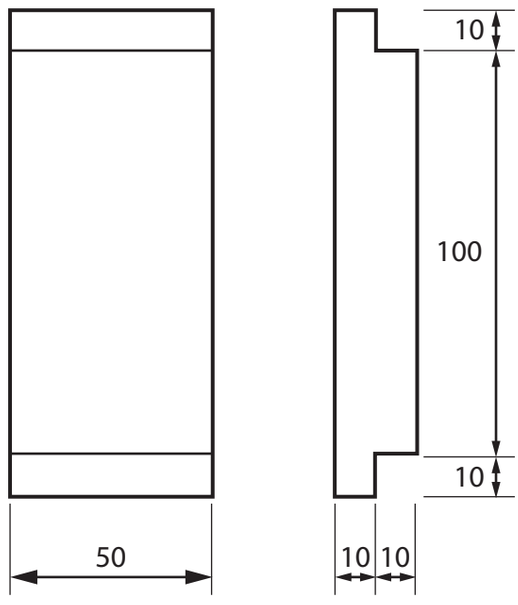
(b) Figure 5 shows an orthographic drawing of one of the pieces of the mechanical toy.



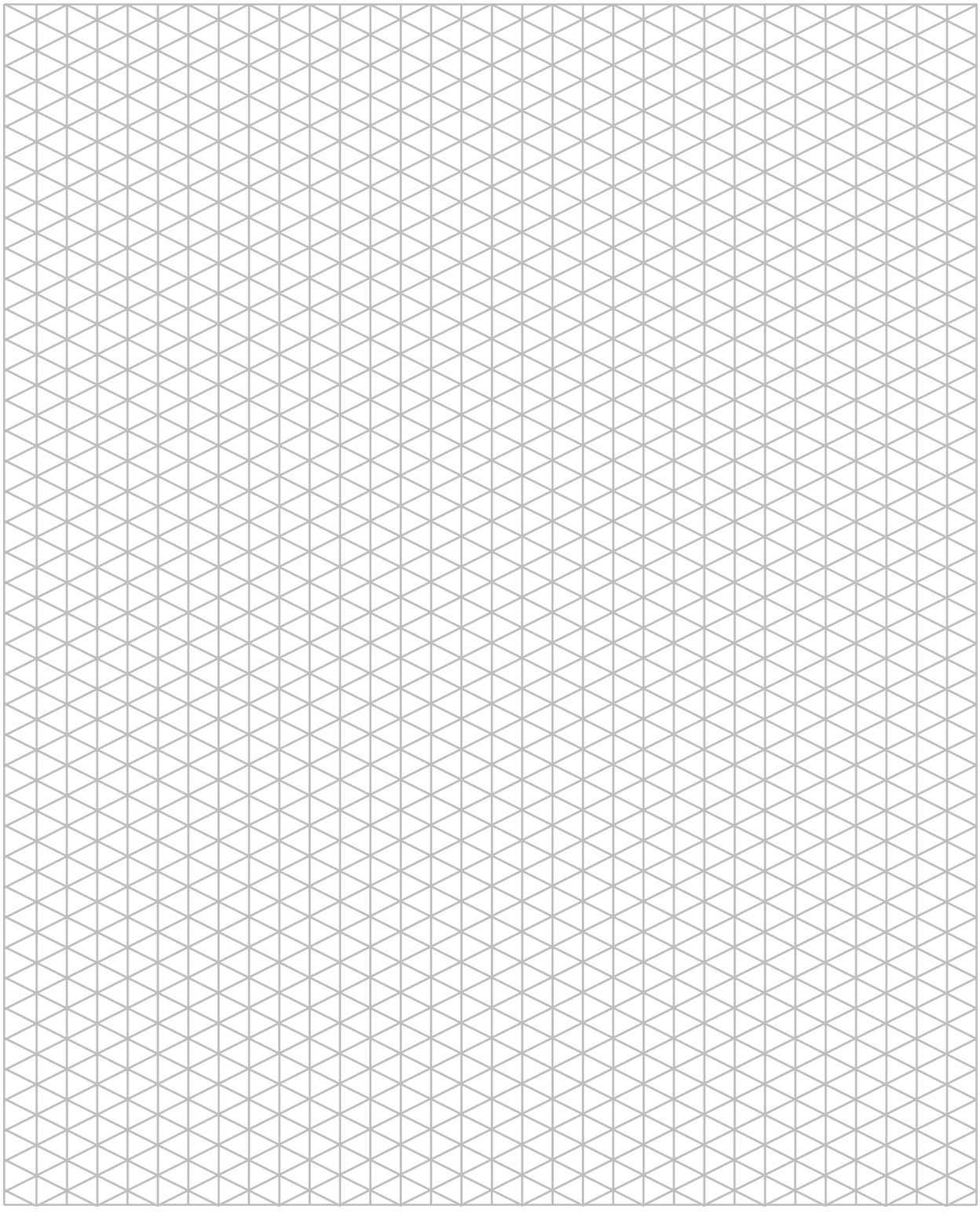
Not to scale
All dimensions in mm

Figure 5

Draw an accurate full-sized view of the piece shown in Figure 5.

Use the grid provided on the opposite page.

(4)



5 mm isometric grid

(Total for Question 2 = 9 marks)

3 Figure 6 shows a mobile phone pocket hanger made from recycled denim jeans.

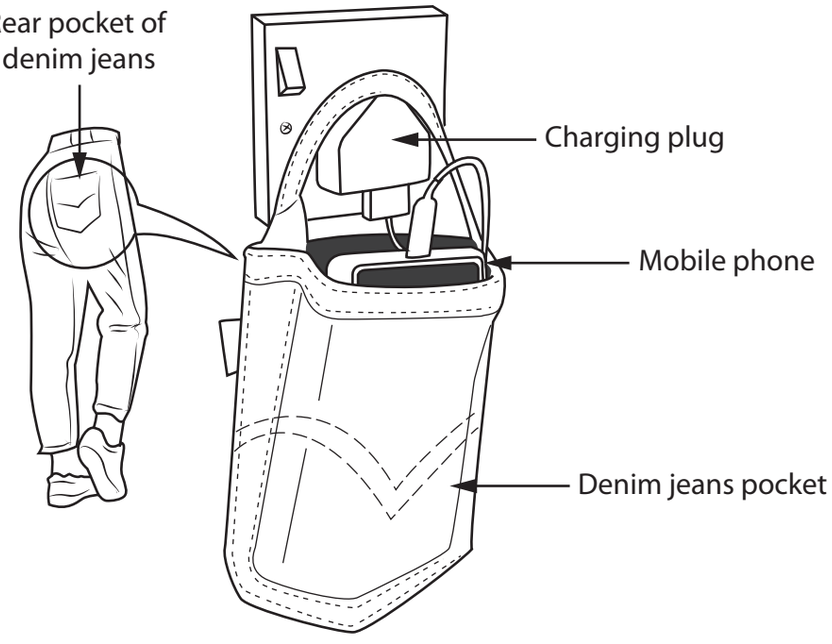


Figure 6

(a) Give **one** property of denim that makes it an appropriate material from which to make the jeans.

(1)

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(b) Explain **one** reason for manufacturing the mobile phone pocket hangers in small batches.

(2)

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(c) The company that makes the mobile phone pocket hangers was funded by a government start-up loan.

Explain **one** advantage of government funding for new business start-ups.

(2)

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(d) In 2014, the worldwide denim market was valued at £144 million with demand estimated to grow at 8% annually.

Calculate what the worldwide value of the denim market will be in 2016.

Give your answer to the nearest whole number.

(2)

£ .....

(e) The factory where the mobile phone pocket hangers are manufactured uses only renewable energy sources such as tidal, wind, solar and hydroelectric power.

Explain **two** reasons why the factory might use renewable energy sources.

(4)

1 .....

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(Total for Question 3 = 11 marks)

4 Figure 7 shows an aluminium foil takeaway container with a solid white board lid.

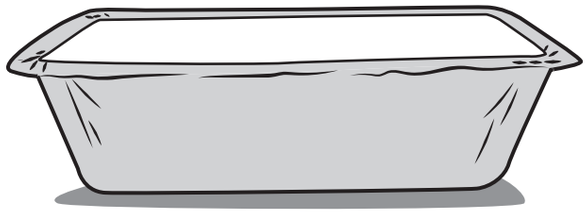

Figure 7

(a) (i) One reason why aluminium is used for the takeaway container is that it can be easily recycled.

Explain **one** other reason for using aluminium for the takeaway container.

(2)

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(ii) Explain **one** advantage of using solid white board for the lid.

(2)

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(b) Figure 8 is a chart showing the use of aluminium in 2007.

Analyse the chart.

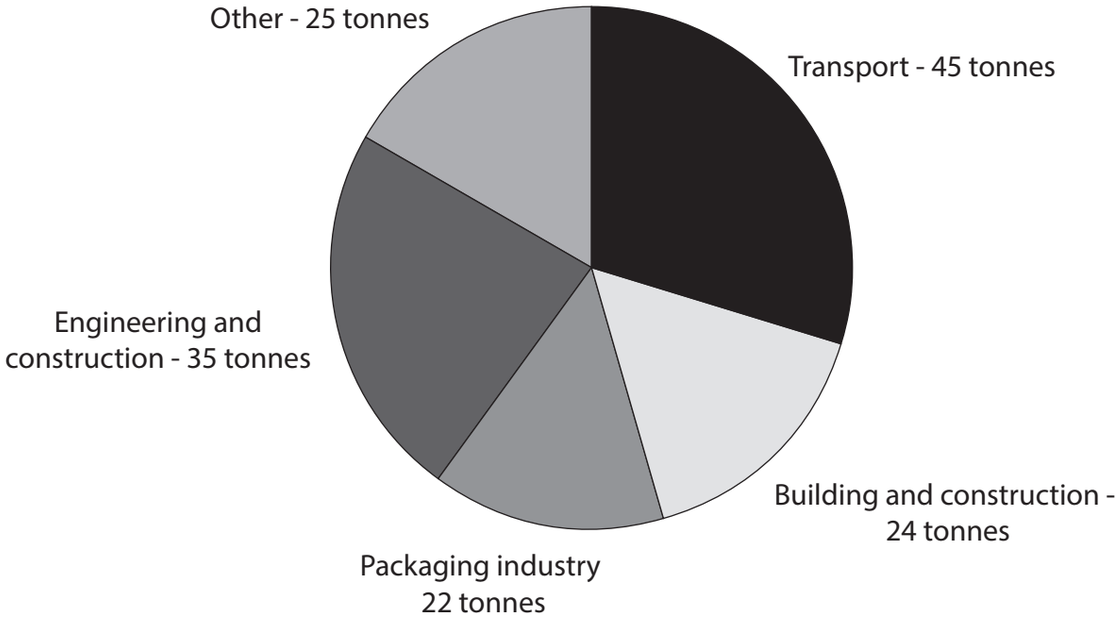


Figure 8

The aluminium used was sourced from recycled and new aluminium in the ratio of 18:38

Calculate how much recycled aluminium was used in the packaging industry.

Give your answer to two decimal places.

(2)

Answer = ... Million Tonnes

(c) Figure 9 shows the percentage of aluminium manufactured by countries in 2014.

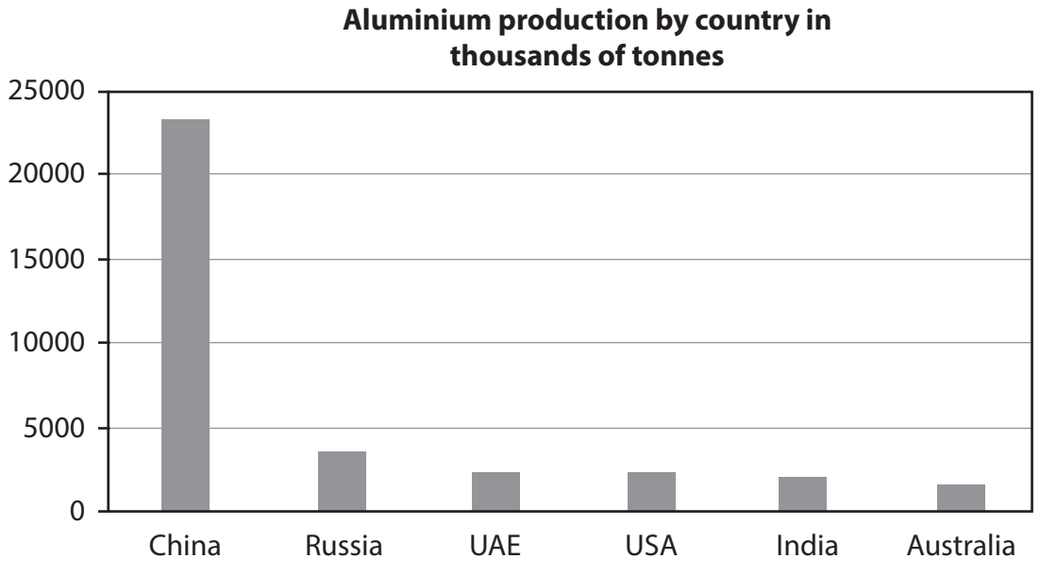


Figure 9

Discuss the environmental, social and economic issues that relate to the manufacture of aluminium.

Use the data in Figure 9 to support your answer.

(6)

(Total for Question 4 = 12 marks)

TOTAL FOR SECTION A = 40 MARKS

SECTION B – SYSTEMS

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

5 Figure 10 shows a design solution for a door alarm using a light-dependant resistor (LDR) sensor. When the LDR senses light, a light-emitting diode (LED) panel flashes to alert the owner that the door has been opened.

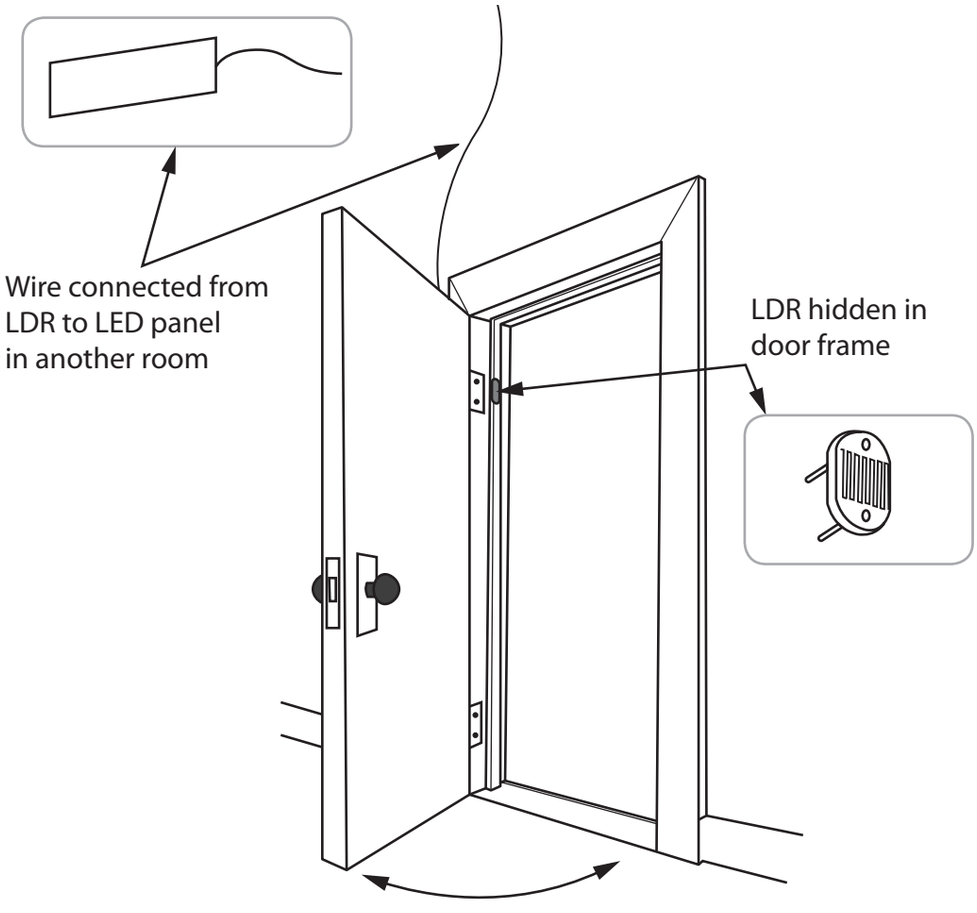


Figure 10

(a) The door alarm needs to be improved to include the following specification points.

The door alarm must:

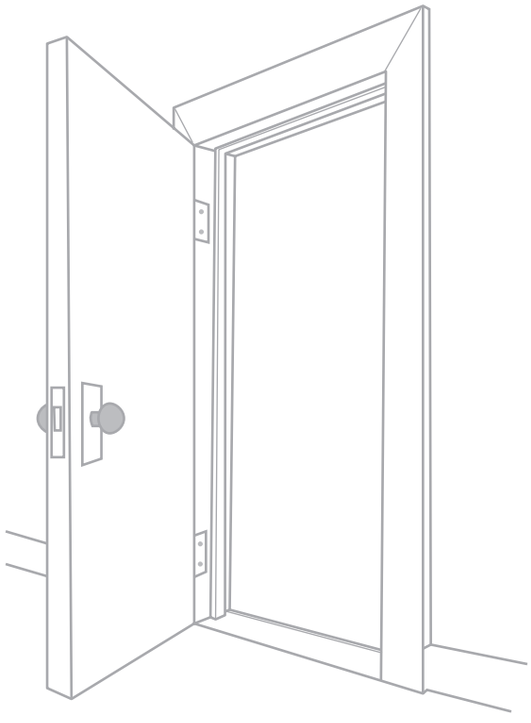
- be able to sense when the door is open and closed during light and dark conditions
- have an audible method of alerting the owner when the door is opened
- be securely attached and removable.

Use notes and sketches to show how the door alarm could be modified to include these three specification points.

You will be marked on how you apply your understanding of design and technology, not your graphical skills.

Use the outline of the door frame to show your modifications

(6)



(b) Figure 11 shows a never ending calendar.

Figure 11

Explain **two** ways by which the calendar meets or fails to meet the criteria of showing the correct date.

(4)

1 .....

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(Total for Question 5 = 10 marks)

6 Figure 12 shows a circuit board.

It will be populated with surface-mount technology (SMT) components.

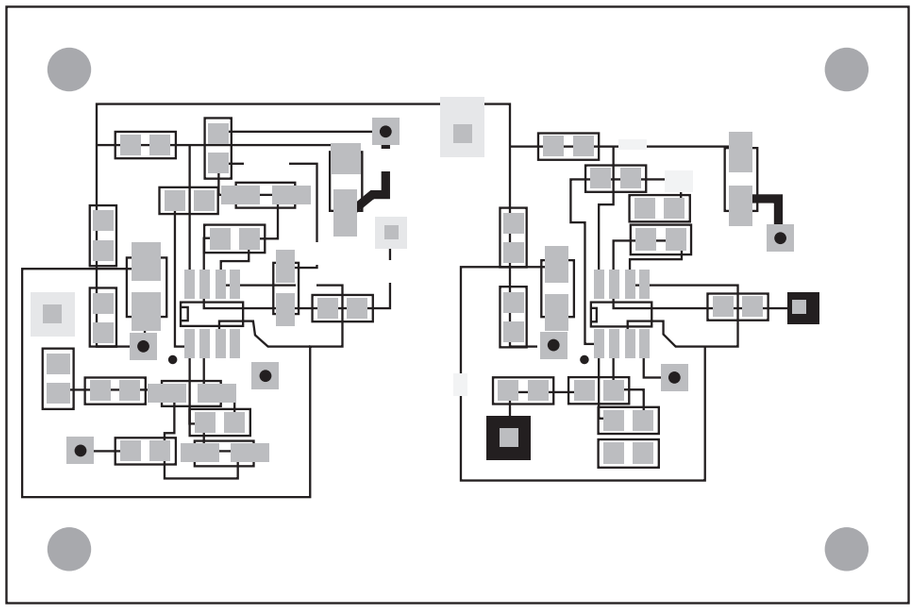

Figure 12

(a) Explain **two** advantages of assembling the circuit board by using SMT components rather than through hole components.

(4)

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(b) Figure 13 shows a drill bit that is used to drill the mounting holes for the circuit board.

Figure 13

Use notes and sketches to show how you would set up the pillar drill to drill the mounting holes when making a batch of 50 identical PCBs.

You will be marked on how you apply your understanding of design and technology, not your graphical skills.

(4)

(c) Explain **one** reason why sleeving is used to cover soldered connections to off-board components.

(2)

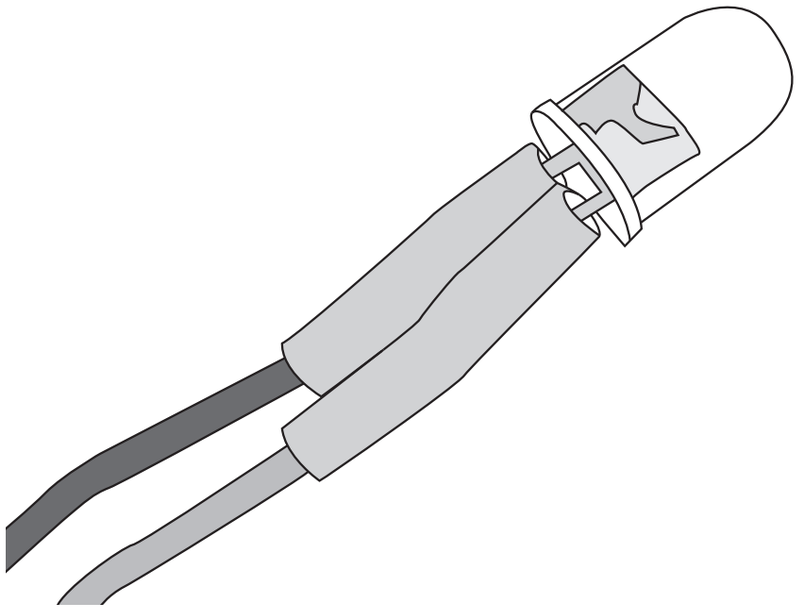

Figure 14

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(d) Figure 15 shows a prototype of a polymer case to hold a circuit board.

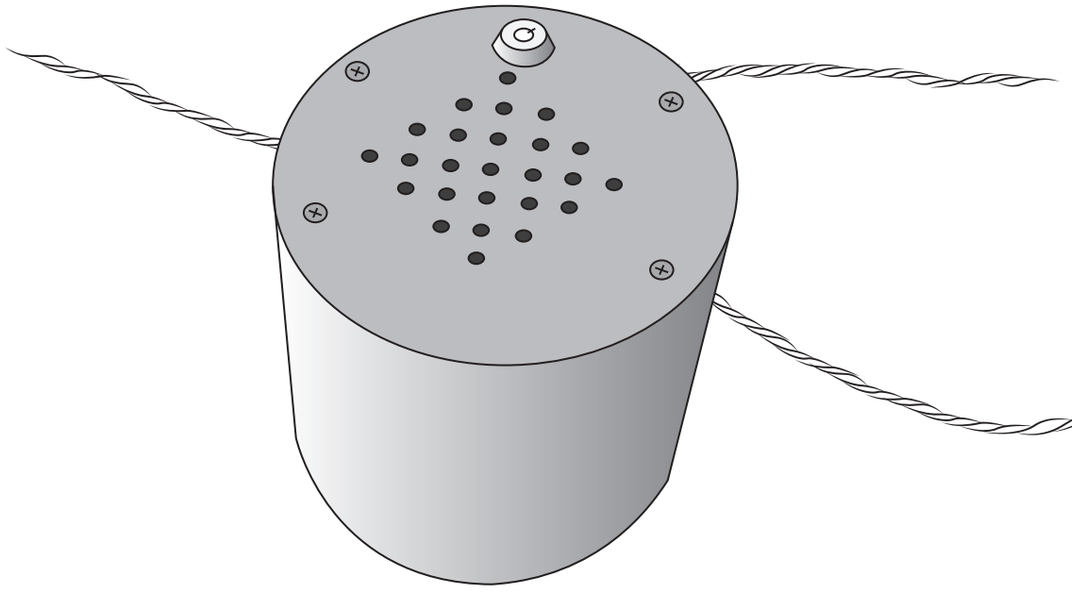

Figure 15

Name **two** different methods that can be used to batch produce the polymer case.

For each method, explain **one** advantage to the manufacturer of using this method.

(6)

Method 1

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Explanation

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Method 2

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Explanation

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(Total for Question 6 = 16 marks)

7 Figure 16 shows a USB stick.

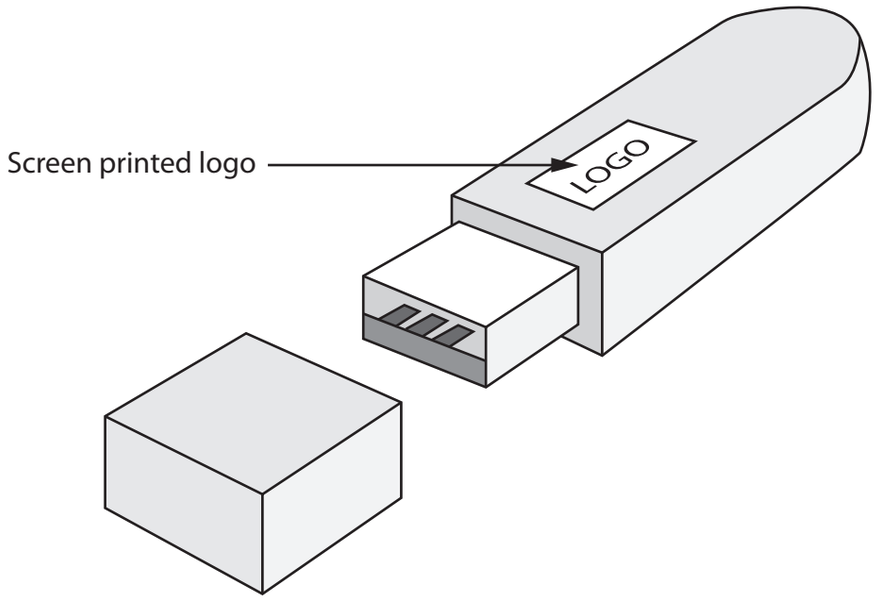

Figure 16

The case is manufactured from ABS polymer.

(a) The majority of polymers are manufactured from crude oil.

Name **one** country that crude oil can be sourced from.

(1)

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(b) The ABS case is screen printed with a logo.

Explain **two** reasons for using screen printing rather than paint to produce the logo on the ABS case.

(4)

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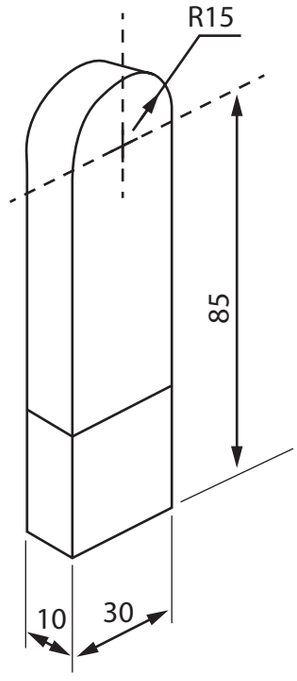
(c) Figure 16 shows the details of the assembled case.

The case needs a coat of lacquer.



All dimensions in mm

Figure 16

Calculate the volume of lacquer required to coat 100 cases with one coat, in millilitres (ml).

Ignore any wastage that might occur due to drips and spillages.

Give your answer to two decimal places.

Area of a circle = πr^2

Circumference of a circle = $2 \pi r$

Use $\pi = 3.142$

1 litre of lacquer covers 12 m^2

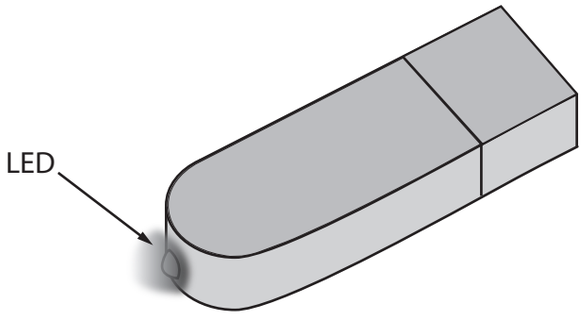
(5)

Answer ..... ml

(d) The USB stick will include an LED torch.

Explain **two** characteristics of an LED that makes it an appropriate choice of light source for the torch.

(6)



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(Total for Question 7 = 16 marks)

8 Figure 17 shows a solar powered laptop.

The rugged and water-resistant design includes fold out solar panels that are stored in the laptop lid.

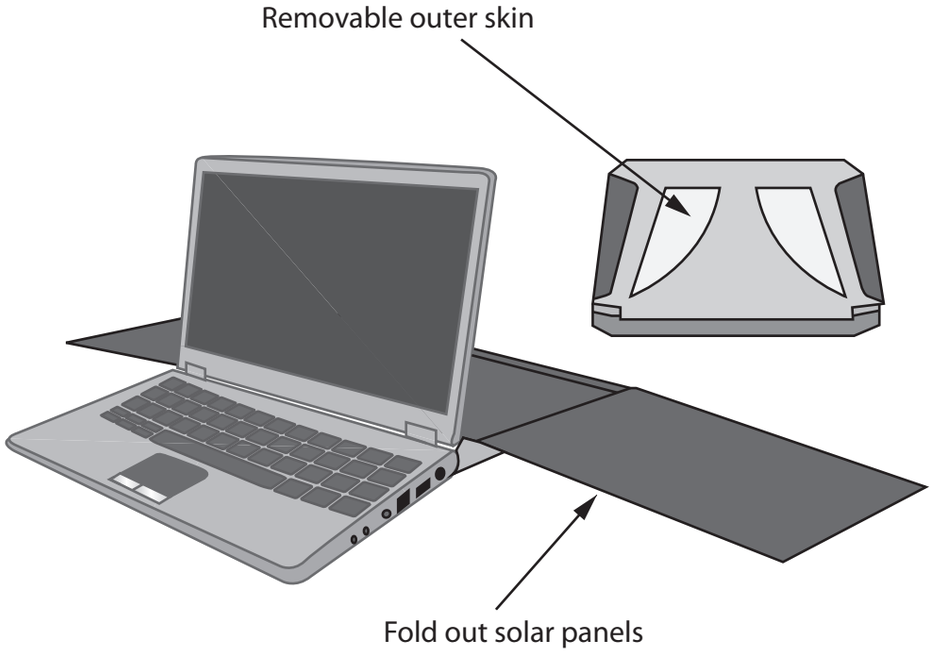

Figure 17

(a) The laptop case is fitted with a removable outer skin.

(i) Explain **one** reason for fitting a removable outer skin to the laptop.

(2)

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(ii) Figure 18 shows a diagram of a circuit that is used to control a motor that drives the cooling fans on the laptop.

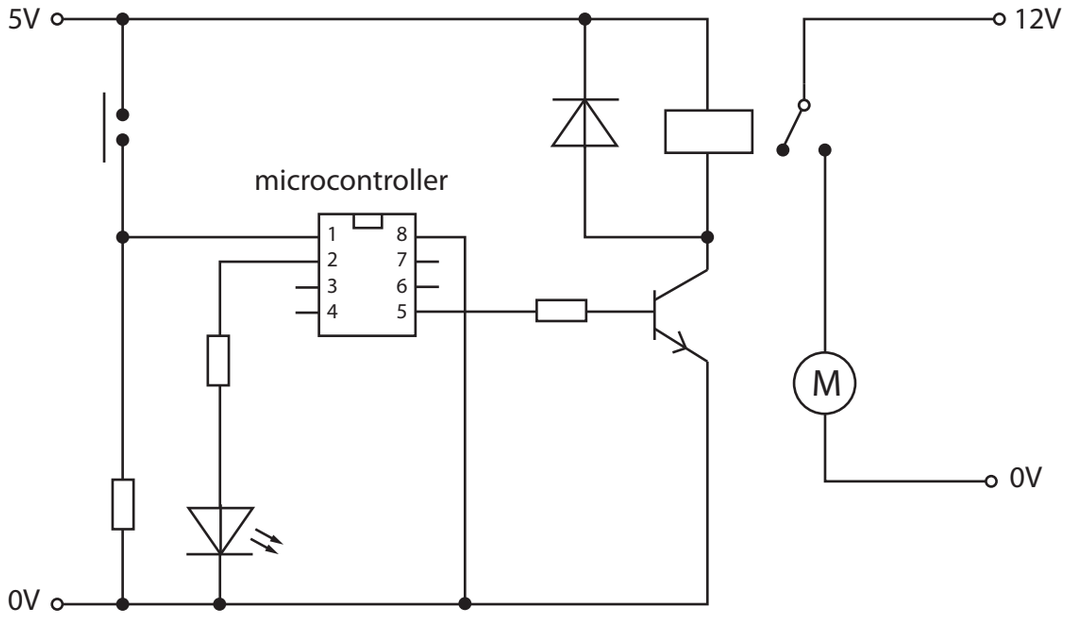

Figure 18

Explain the function of the relay in this circuit.

(3)

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(b) The PCB for the laptop will be assembled using pick and place technology.

Explain **two** advantages of using pick and place technology for assembling the PCB.

(4)

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2 .....

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(c) The laptop is manufactured in China and sold all around the world.

Figure 19 shows information about the solar powered laptop.

Construction method	Automated production
Materials	ABS, rubber and toughened glass
Potential market	Outdoor workers, relief agencies, exploration companies
Life span	5-10 years
Charging time	Less than 2 hours

Figure 19

Analyse the information in Figure 19.

Evaluate the solar powered laptop with reference to social factors including:

- use for different social groups
- trends / fashion
- popularity.

(9)

(Total for Question 8 = 18 marks)

TOTAL FOR SECTION B = 60 MARKS
TOTAL FOR PAPER = 100 MARKS

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