



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

1. The development of new materials and processes has had an effect on modern technology.

(a) Explain **one** advantage of using 'polymorph' when developing a product.

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**(2)**

(b) Give **two** advantages of using phosphorescent pigments in safety signage.

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**(2)**

(c) 'Biopol' is considered an 'environmentally friendly plastic'.

Explain **two** ways in which Biopol helps the environment.

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**(4)**



(d) Describe **two** ways in which paper and cardboard can be modified to make them suitable as building materials.

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(4)

(Total 12 marks)

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Q1

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2. A company intends to sell light bulbs packaged, displayed and retailed in units of four. Figure 1 shows an illustration of one of the light bulbs.

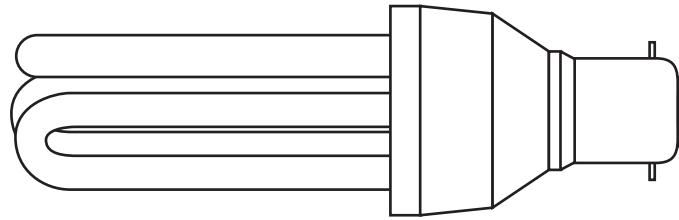


Figure 1

- (a) The light bulb packaging must contain **four** bulbs and provide suitable protection whilst in transit. One of the light bulbs must be clearly visible to the consumer when the package is on display in a shop.

In the space below, design a suitable package for the light bulbs that meets all the requirements outlined above.

(4)



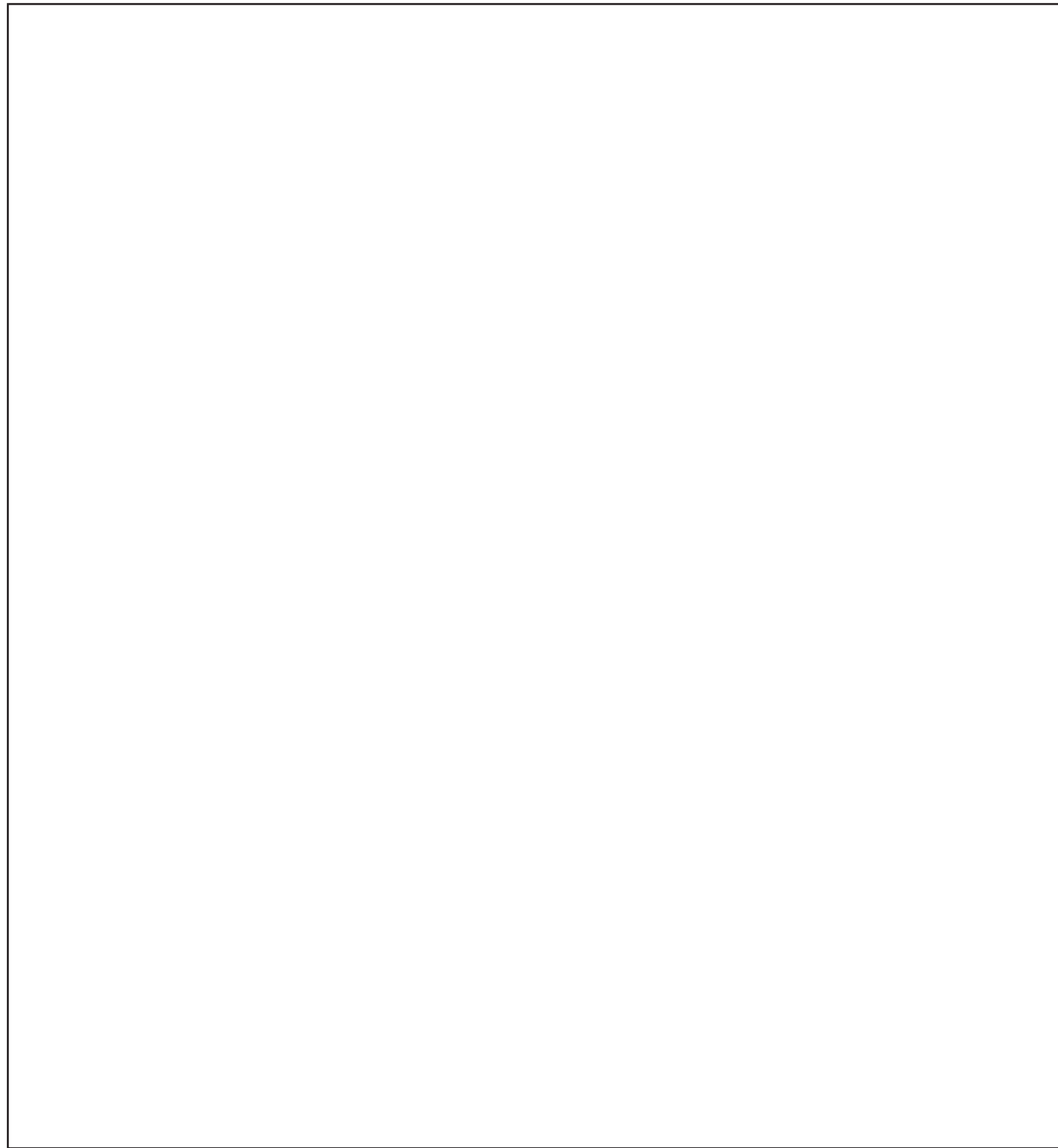
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(b) The light bulbs are energy efficient. The company wants to promote the use of its light bulbs.

In the space below, design a poster which could be used by the company to promote its energy efficient light bulbs.

Your design **must** combine relevant imagery and text for promoting:

- lifestyle marketing
- competitive edge



(3)



(c) The Advertising Standards Agency (ASA) is responsible for regulating advertising in the United Kingdom.

State **three** considerations that the ASA must take into account when assessing the suitability of an advertisement.

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**(3)**

(d) Explain what is meant by the term 'statutory rights' of the consumer when purchasing a product.

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**(2)**

**(Total 12 marks)**

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Q2



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3. Information and Communications Technology (ICT) is widely used in the design, manufacture and retail of products.

(a) Explain **two** ways in which the introduction of electronic point of sale (EPOS) has helped retail stores.

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**(4)**

(b) Explain **two** differences between bar codes and radio frequency identification tags (RFID).

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**(4)**





4. Simple and complex production systems can be represented by flow diagrams.

(a) In the space below, draw a labelled diagram of a simple closed loop control system.



(4)

(b) Explain **one** advantage of a closed loop system compared with an open loop system.

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(2)

(c) Within any closed loop system there are degrees of freedom.

With reference to robotic arms, explain what is meant by the term 'degrees of freedom'.

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(2)



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(d) A key feature of concurrent manufacturing is a team based approach to product development.

Explain **two** ways in which this team based approach achieves a more efficient manufacturing process.

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(4)

Q4

(Total 12 marks)



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5. (a) Explain **three** advantages associated with 'economies of scale' when mass producing products.

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(6)

(b) ICT can be used to produce a production schedule when manufacturing products. This can be done using a computer program.

(i) Outline **four** pieces of information that need to be entered into a production scheduling computer program to produce an efficient production plan.

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(4)



(ii) Describe how a coordinate measuring machine (CMM) monitors the quality of a product during manufacture.

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(2)

(Total 12 marks)

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Q5

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6. There are many aspects to consider when carrying out a Life Cycle Assessment (LCA) of a new product.

(a) The reduction in the impact on the environment is an aspect of a Life Cycle Assessment.

Describe **two** ways in which industry can reduce the impact that manufacturing processes have on the environment.

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(4)

(b) The ability to recycle materials and products is a further aspect of Life Cycle Assessment.

Explain **two** problems associated with recycling paper.

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(4)









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<p style="text-align: right;"><b>(Total 8 marks)</b></p>	<p><b>Q7</b></p>
<p style="text-align: right;"><b>TOTAL FOR PAPER: 80 MARKS</b></p>	
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