

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

1. (a) Figure 1 shows a sign sometimes found on certain polymer containers.



Figure 1

- (i) State what the arrowed triangle shown in Figure 1 indicates.

..... (1)

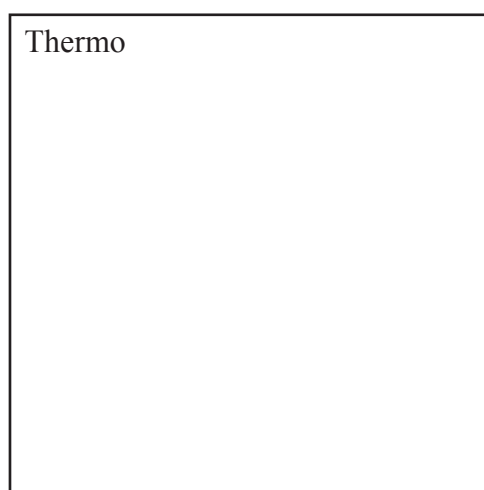
- (ii) State which polymer is indicated by the number 3 within the arrowed triangle in Figure 1.

..... (1)

- (b) Polymers can be either thermo or thermosetting depending on how the molecules of the polymer are held together.

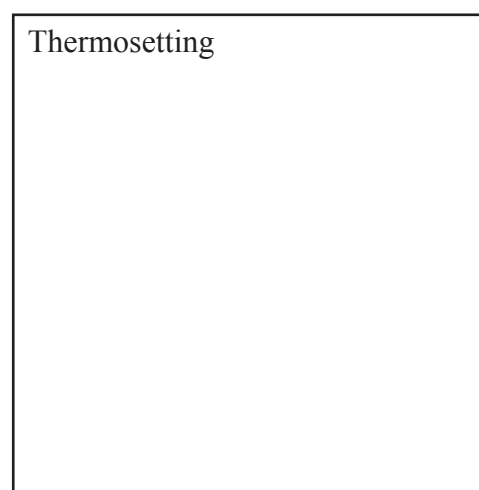
- (i) In the spaces provided below, sketch the polymer chain associated with each group.

Thermo



(1)

Thermosetting



(1)



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(ii) State the term used to describe how the thermo polymer chains are held together.

.....
(1)

(iii) State the term used to describe how the thermosetting polymer chains are held together.

.....
(1)

(iv) State **three** ways in which the polymer chain structure of thermoplastics influence how a thermoplastic can be formed.

1

2

3

(3)

Q1

(Total 9 marks)



2. This question relates to the pictorial designer's sketch for a cardboard box shown in Figure 2.

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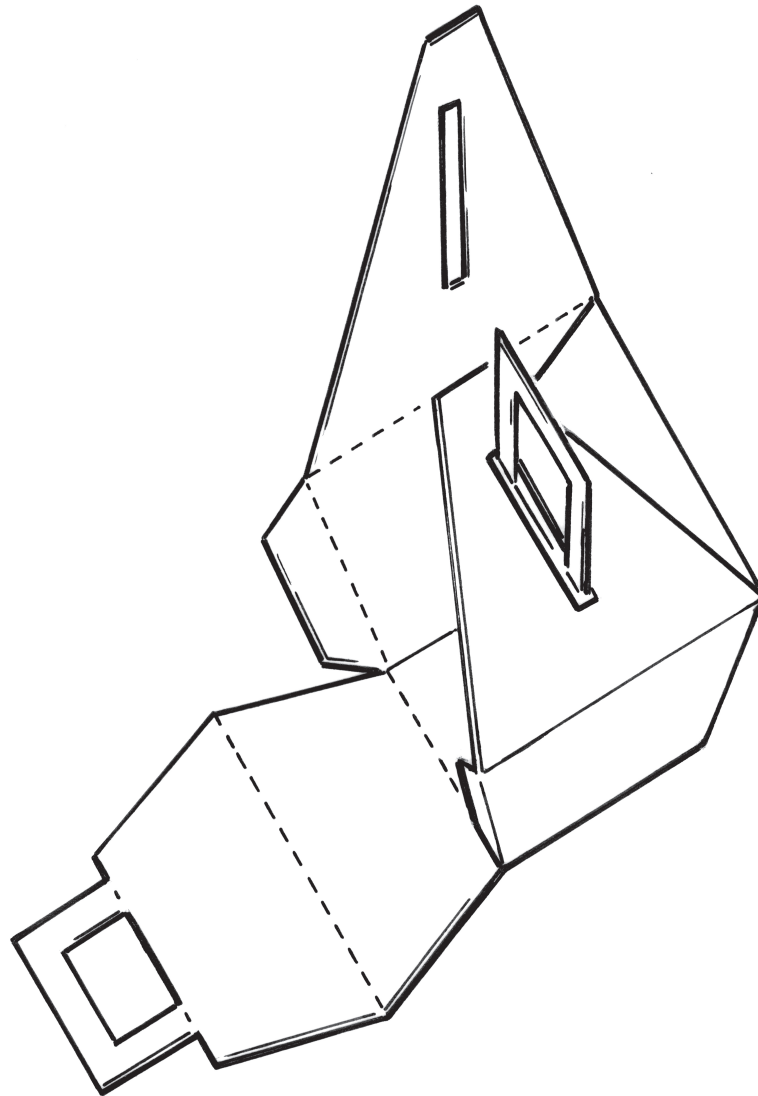


Figure 2



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(a) Sketch the net (development) of the cardboard box in Figure 2.

Your sketch should clearly show fold/crease lines, cut lines and fixing flaps.



(6)

(b) Explain **one** reason why computer graphics would be used to design the cardboard box.

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(2)



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(c) The cardboard box is to be manufactured commercially employing a Computer Integrated Manufacturing (CIM) system.

Explain **two** ways in which Computer Integrated Manufacture (CIM) will make the production of the cardboard box more efficient.

1

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2

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(4)

Q2

(Total 12 marks)



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3. Figure 3 shows a mass produced printer cartridge box.



Figure 3

(a) Give **three** reasons why carton-board is an appropriate material for the mass produced printer cartridge box.

- 1
- 2
- 3

(3)



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blank

(b) The nets of the printer cartridge box are commercially colour printed.

(i) Outline **three** main processing stages in the mass production of the printer cartridge box after printing.

Do not address preparation, quality checks, safety issues or assembly in your response.

1

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2

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3

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(3)

(ii) Outline **two** main assembly stages of the printer cartridge box.

Do not address preparation, quality checks or safety issues in your response.

1

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2

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(2)



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(c) Describe **two** of the following methods of quality control that could be used during the final colour printing of the box

- Colour bars
- Registration marks
- Crop marks
- Greyscale

Quality control method 1.....

Description

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Quality control method 2.....

Description

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(4)

Q3

(Total 12 marks)



4. (a) Laminated materials play an important part in modern day living.

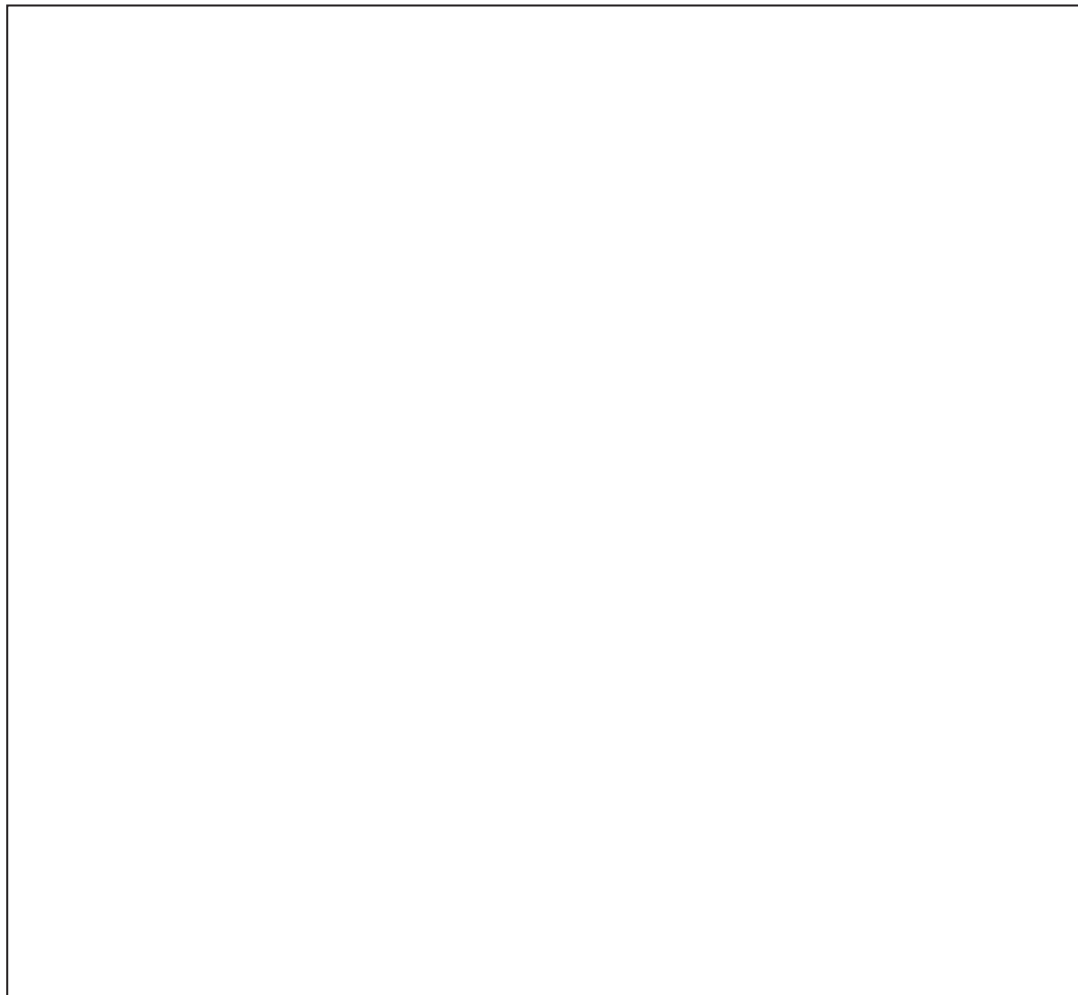
(i) State **two** reasons for laminating materials.

1

2

(2)

(ii) Plywood is a laminated material. Use notes and/or annotated sketches to show the construction of plywood.



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(3)



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(b) Describe **two** of the mechanical properties listed below.

- Hardness
- Toughness
- Ductility

Mechanical property 1

Description.....

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Mechanical property 2

Description.....

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(4)

Q4

(Total 9 marks)



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5. A shop is replacing its old wooden shop sign. The new shop sign is made up of an acrylic backboard with vinyl lettering.

(a) Explain why acrylic is being used for the new backboard instead of wood.

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..... (2)

(b) Explain **two** advantages that a sign produced using vinyl stickers has over a traditional hand painted sign.

1
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2
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..... (4)

(c) The manufacturer of the sign will use both quality control (QC) and quality assurance (QA) systems when producing a shop sign.

(i) Describe **one** quality control method the sign manufacturer will use.

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..... (2)

(ii) Describe **one** quality assurance method the sign manufacturer will use.

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..... (2)

(Total 10 marks)

Q5

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6. Ergonomics and anthropometrics are very important areas to consider when designing products.

(a) Explain the relationship between ergonomics and anthropometrics.

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(2)

(b) Anthropometric charts frequently refer to the 5th percentile or the 95th percentile.

Explain the term '95th percentile'.

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(2)



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(c) When designing the interior surroundings of a new car the designer must consider the relationship between the user (driver), the product (car) and the installed equipment (interfacing).

Describe **three** specific ergonomic factors the designer must consider when designing the interior of a new car with specific relationship to the driver only.

1

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3

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(6)

Q6

(Total 10 marks)



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7. Just In Time (JIT) systems and mass production are features of product manufacture.

(a) Explain **two** advantages of using a Just In Time (JIT) system in the production process.

1

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2

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(4)

(b) Explain **three** disadvantages of manufacturing a product using mass production techniques.

1

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2

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3

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(6)

Q7

(Total 10 marks)



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8. Choose **one** of the following design movements and describe **four** key features that define that movement.

- The Arts and Crafts movement
- Art Nouveau
- Bauhaus
- Art Deco
- Memphis

Design movement

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