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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
ADVANCED GCE**

F524/01

DESIGN AND TECHNOLOGY

Product Design: Component 1

THURSDAY 23 JUNE 2011: Afternoon

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the question paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

A calculator may be used

**A calculator may
be used for this
paper**

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **This paper is to be taken with F524/02 in the same examination session of 2 HOURS 30 MINUTES. The times given on the front of each paper are advisory.**
- **Components 1 and 2 should be available to candidates for the full session.**
- **Answer ONE question only from component 1 and ONE question only from component 2.**
- **Component 1 and Component 2 choices can be from different material areas although it is envisaged that most candidates will select the same material area.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **The discuss question will be used to assess the quality of written communication.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [] at the end of each question or part question.**
- **The total number of marks for this paper is 36.**
- **All dimensions are in mm.**
- **Where appropriate calculations should be shown.**

1 BUILT ENVIRONMENT AND CONSTRUCTION

Fig. 1 shows a floor structure.

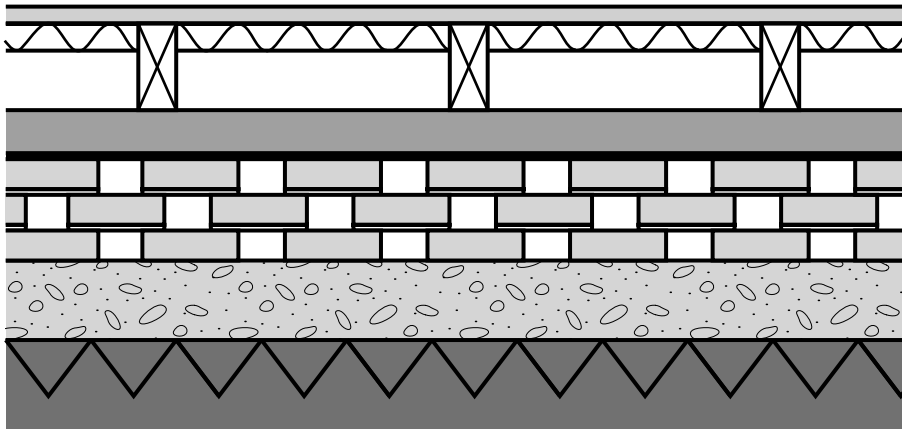


Fig. 1

(a) Give FOUR design requirements for the floor structure shown in Fig. 1. Justify each requirement.

1 _____

2 _____

3 _____

4 _____

[4]

- (b) Describe TWO examples where ergonomics has influenced the design of flooring.
Use sketches and/or notes where appropriate.**

EXAMPLE 1

EXAMPLE 2

(c) Describe TWO ways in which designs relating to the Built Environment and Construction can be legally protected.

1 _____

2 _____

[4]

(d) Explain TWO ways in which consumers can be assured that they are purchasing a quality product in relation to the Built Environment and Construction.

1 _____

2 _____

[4]

- (e) (i) State a SUITABLE SPECIFIC MATERIAL for the finish to the floor structure shown in Fig. 1. Give TWO properties or characteristics that make the material suitable for this use.**

[3]

- (ii) Describe, in detail, how an upper floor structure can provide lateral restraint to an external cavity wall.
Use annotated diagrams to support your answer.**

[9]

(f) Discuss the factors that influence scale of production in the domestic housing market.

[8]

Question 1 Total [36]

2 ENGINEERING

Fig. 2 shows a decorative metal screen on a hotel balcony.

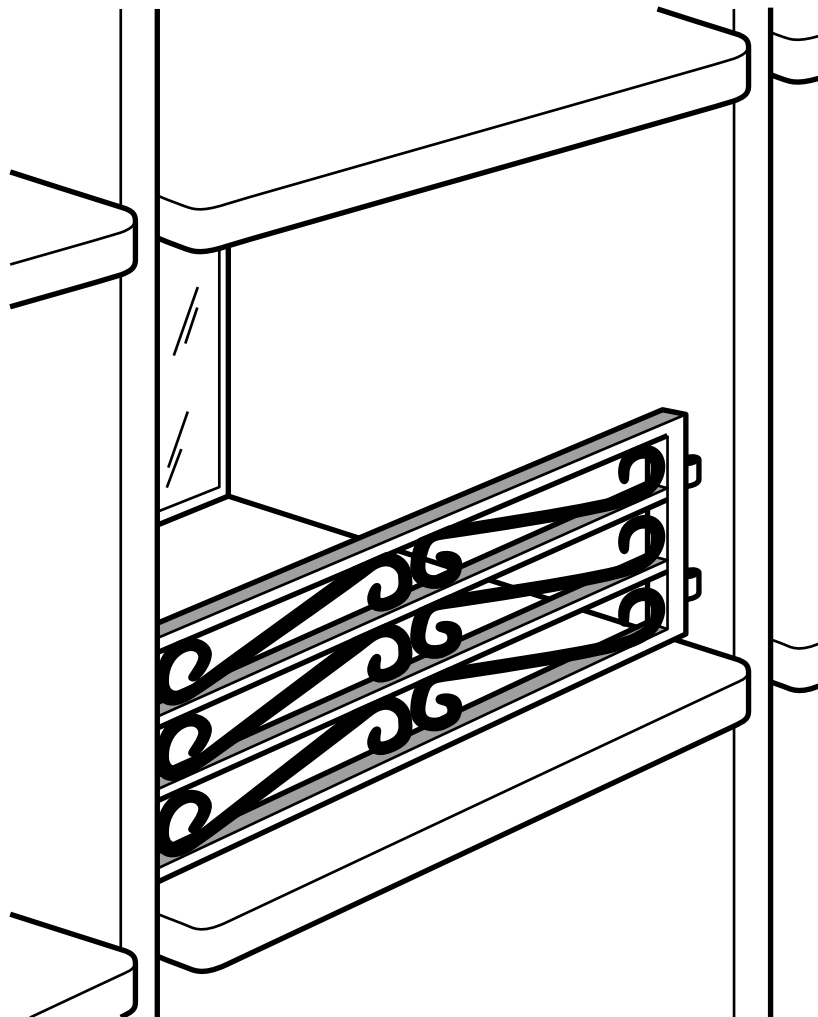


Fig. 2

(a) Give FOUR design requirements for the decorative screen shown in Fig. 2. Justify each requirement.

1 _____

2 _____

3 _____

4 _____

[4]

- (b) Describe TWO examples where ergonomics has influenced the design of the decorative metal screen on a hotel balcony shown in Fig. 2. Use sketches and/or notes where appropriate.**

EXAMPLE 1

EXAMPLE 2

(c) Describe TWO ways in which the design of engineered products can be legally protected.

1 _____

2 _____

[4]

(d) Explain TWO ways in which consumers can be assured that they are purchasing a quality engineered product.

1 _____

2 _____

[4]

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Fig. 3 shows one of the scrolls from the decorative metal screen.

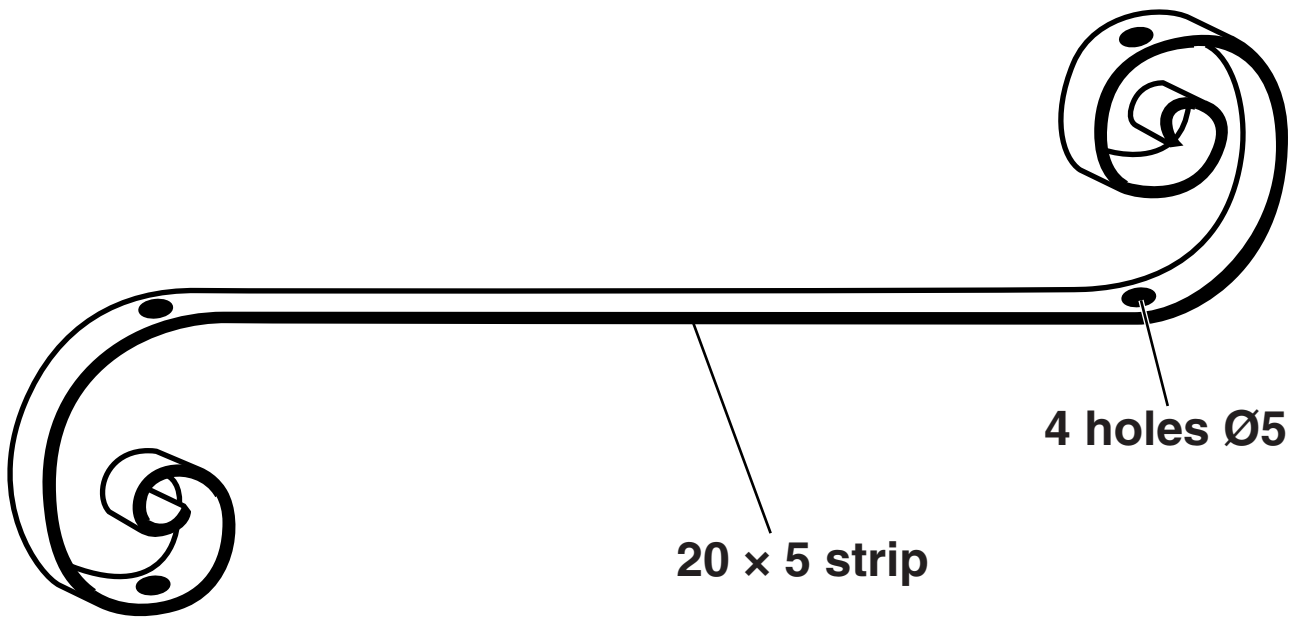


Fig. 3

- (e) (i) State a SUITABLE SPECIFIC METAL for the scroll shown in Fig. 3. Give TWO properties or characteristics that make the metal suitable for this use.**

[3]

- (ii) Describe, in detail, how the scroll shown in Fig. 3 would be manufactured. Give details of any special tooling and quality control checks that would be used. Use a flowchart and/or annotated diagrams to support your answer.**

[9]

(f) Discuss the factors that influence scale of production of engineered products.

[8]

Question 2 Total [36]

3 FOOD

Fig. 4 shows a lemon meringue pie and pie slice.

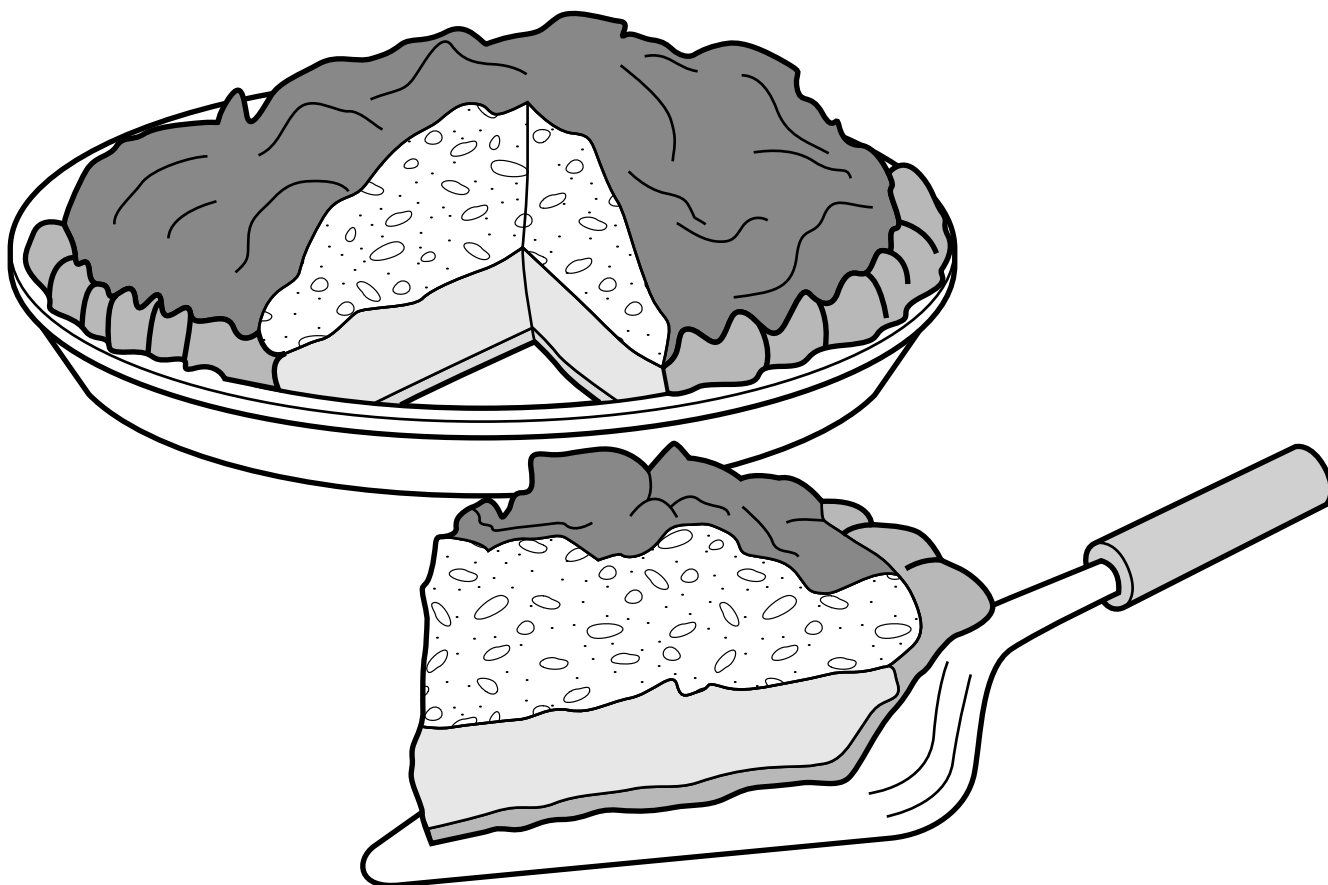


Fig. 4

(a) Give FOUR design requirements for a lemon meringue pie shown in Fig. 4. Justify each requirement.

1 _____

2 _____

3 _____

4 _____

[4]

- (b) Describe TWO examples where ergonomics has influenced the design of the pie slice as shown in Fig. 4.
Use sketches and/or notes where appropriate.**

EXAMPLE 1

EXAMPLE 2

(c) Describe TWO ways in which the design of food products can be legally protected.

1 _____

2 _____

[4]

(d) Explain TWO ways in which consumers can be assured that they are purchasing a quality food product.

1 _____

2 _____

[4]

- (e) (i) State a SUITABLE SPECIFIC INGREDIENT for making meringue. Give TWO properties or characteristics that make the ingredient suitable for this use.**

[3]

- (ii) Describe, in detail, how the pastry case for the lemon meringue pie shown in Fig. 4 would be manufactured as a batch of 20. Include details of all ingredients and the scientific principles underlying the process. Use a flowchart and/or annotated diagrams to support your answer.**

[8]

Question 3 Total [36]

4 GRAPHIC PRODUCTS

Fig. 5 shows a credit card which will be printed in colour.

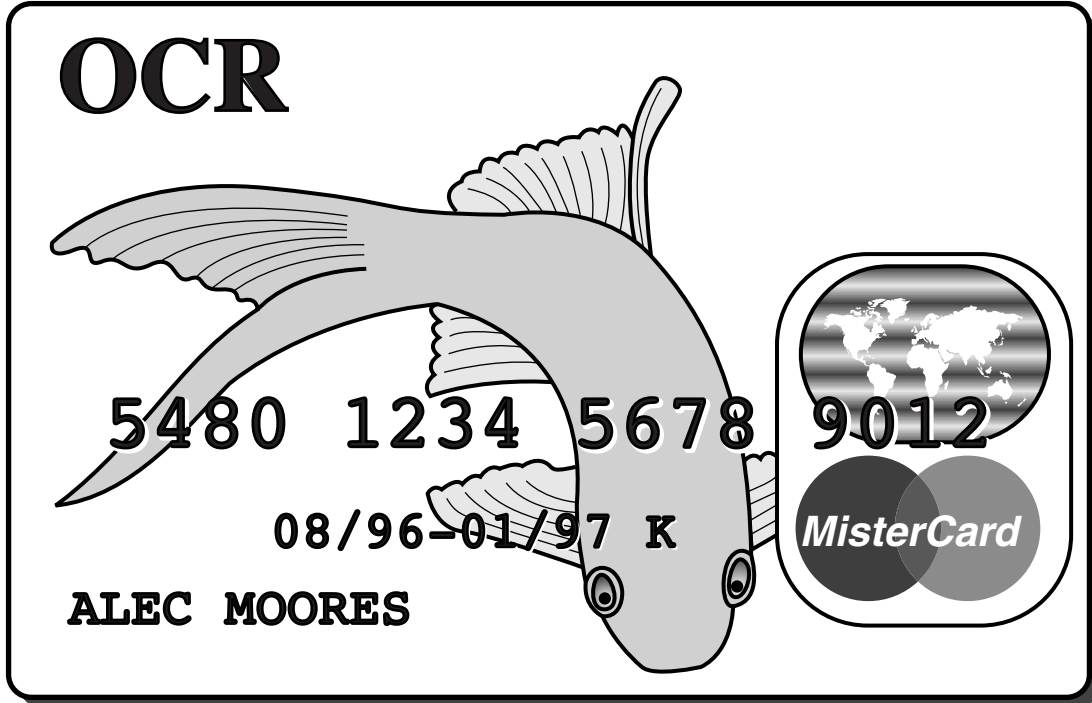


Fig. 5

(a) Give FOUR design requirements for the printed credit card shown in Fig. 5. Justify each requirement.

1 _____

2 _____

3 _____

4 _____

[4]

- (b) Describe TWO examples where ergonomics has influenced the design of the credit card shown in Fig. 5.
Use sketches and/or notes where appropriate.**

EXAMPLE 1

EXAMPLE 2

(c) Describe TWO ways in which the design of graphic products can be legally protected.

1 _____

2 _____

[4]

(d) Explain TWO ways in which consumers can be assured that they are purchasing quality graphic products.

1 _____

2 _____

[4]

- (e) (i) State a SUITABLE SPECIFIC MATERIAL for the credit card.
Give TWO properties or characteristics that make the material suitable for this use.**

[3]

- (ii) Describe, in detail, how the background image would be applied to the credit card blank, manufactured in a batch of 100 000.
Use a flowchart and/or annotated diagrams to support your answer.**

[9]

(f) Discuss the factors that influence scale of production in the Graphics Industry.

[8]

Question 4 Total [36]

5 MANUFACTURING

Fig. 6 shows a chair with wooden side frames.



Fig. 6

(a) Give FOUR design requirements for the chair shown in Fig. 6. Justify each requirement.

1 _____

2 _____

3 _____

4 _____

[4]

(b) Describe TWO examples where ergonomics has influenced the design of the chair shown in Fig. 6. Use sketches and/or notes where appropriate.

EXAMPLE 1

EXAMPLE 2

[4]

(c) Describe TWO ways in which the design of manufactured products can be legally protected.

1 _____

2 _____

[4]

(d) Explain TWO ways in which consumers can be assured that they are purchasing a quality manufactured product.

1 _____

2 _____

[4]

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Fig. 7 shows one of the wooden side frames for the chair.

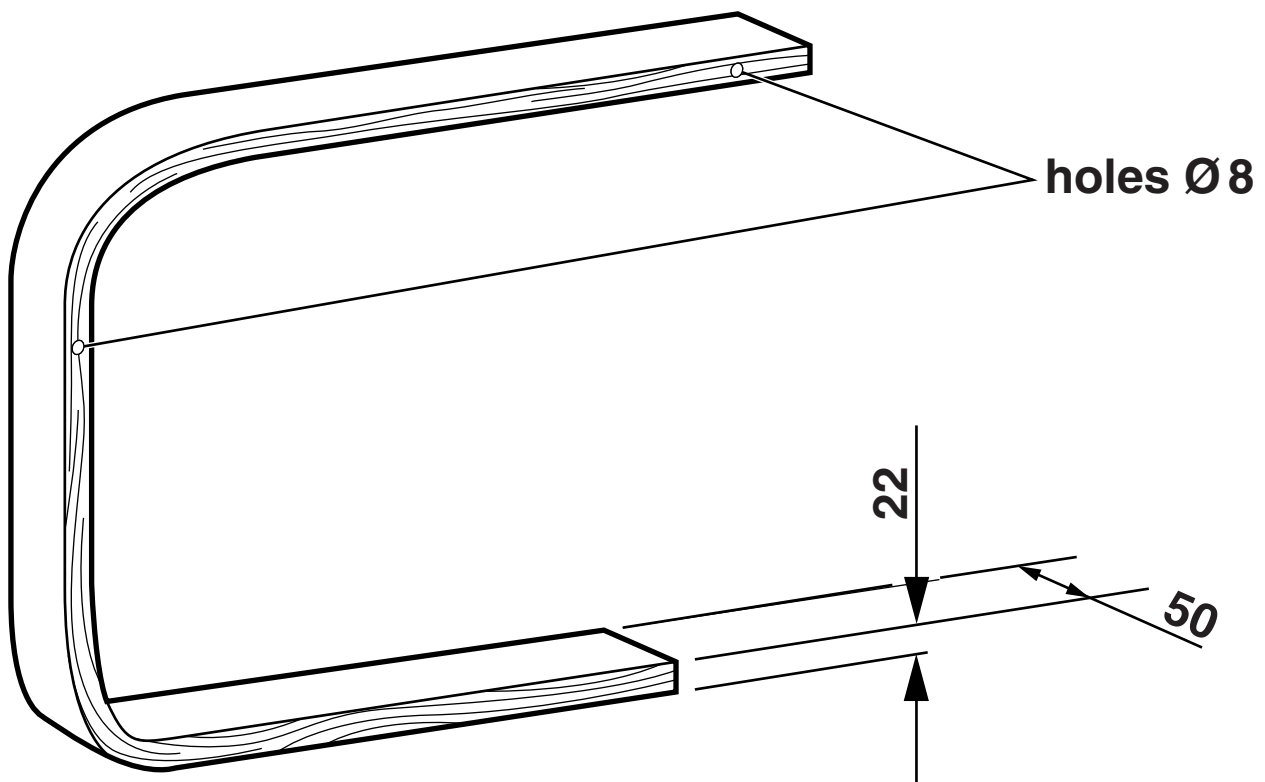


Fig. 7

- (e) (i) State a SUITABLE SPECIFIC MATERIAL for the side frame shown in Fig. 7. Give TWO properties or characteristics that make the material suitable for this use.**

[3]

(ii) Describe, in detail, how the side frame shown in Fig. 7 would be manufactured as a batch of 5000.

Include details of any special equipment and quality control checks that would be used.

Use a flowchart and/or annotated diagrams to support your answer.

[9]

[8]

Question 5 Total [36]

6 RESISTANT MATERIALS

Fig. 8 shows a holder for art materials.

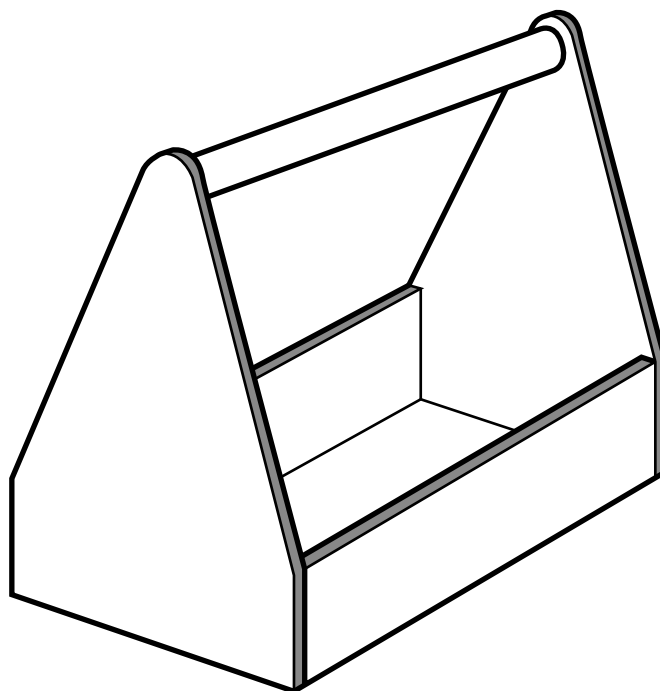


Fig. 8

(a) Give FOUR design requirements for the holder of art materials shown in Fig. 8. Justify each requirement.

1 _____

2 _____

3 _____

4 _____

[4]

- (b) Describe TWO examples where ergonomics has influenced the design of the holder of art materials shown in Fig. 8.
Use sketches and/or notes where appropriate.**

EXAMPLE 1

EXAMPLE 2

(c) Describe TWO ways in which the design of resistant material products can be legally protected.

1 _____

2 _____

[4]

(d) Explain TWO ways in which consumers can be assured that they are purchasing a quality resistant materials product.

1 _____

2 _____

[4]

- (e) (i) State a SUITABLE SPECIFIC MATERIAL for the holder of art materials shown in Fig. 8. Give TWO properties or characteristics that make the material suitable for this use.**

[3]

- (ii) Describe, in detail, how the holder of art materials shown in Fig. 8 would be manufactured as a batch of 100. Include details of any jigs and formers used. Use a flowchart and/or annotated diagrams to support your answer.**

[9]

[8]

Question 6 Total [36]

7 SYSTEMS AND CONTROL

Fig. 9 shows a cordless food mixer.



Fig. 9

(a) Give FOUR design requirements for the cordless food mixer shown in Fig. 9. Justify each requirement.

1 _____

2 _____

3 _____

4 _____

[4]

- (b) Describe TWO examples where ergonomics has influenced the design of the cordless food mixer shown in Fig. 9.
Use sketches and/or notes where appropriate.**

EXAMPLE 1

EXAMPLE 2

(c) Describe TWO ways in which the design of electronic products can be legally protected.

1 _____

2 _____

[4]

(d) Explain TWO ways in which consumers can be assured that they are purchasing a quality electronic product.

1 _____

2 _____

[4]

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- (e) (i) Sketch a labelled diagram to show a mechanical system which could be used in a cordless food mixer to transfer rotary motion from the electric motor through 90 degrees and provide a speed reduction to drive the beaters.**

[3]

- (ii) The cordless food mixer has an adjustable speed control.**

Describe in detail how PULSE WIDTH MODULATION can be used to control the speed of a DC electric motor.

Use annotated diagrams to support your answer.

Your answer should include a circuit diagram.

[9]

[8]

Question 7 Total [36]

8 TEXTILES

Fig. 10 shows an outdoor jacket. The jacket is fully lined.

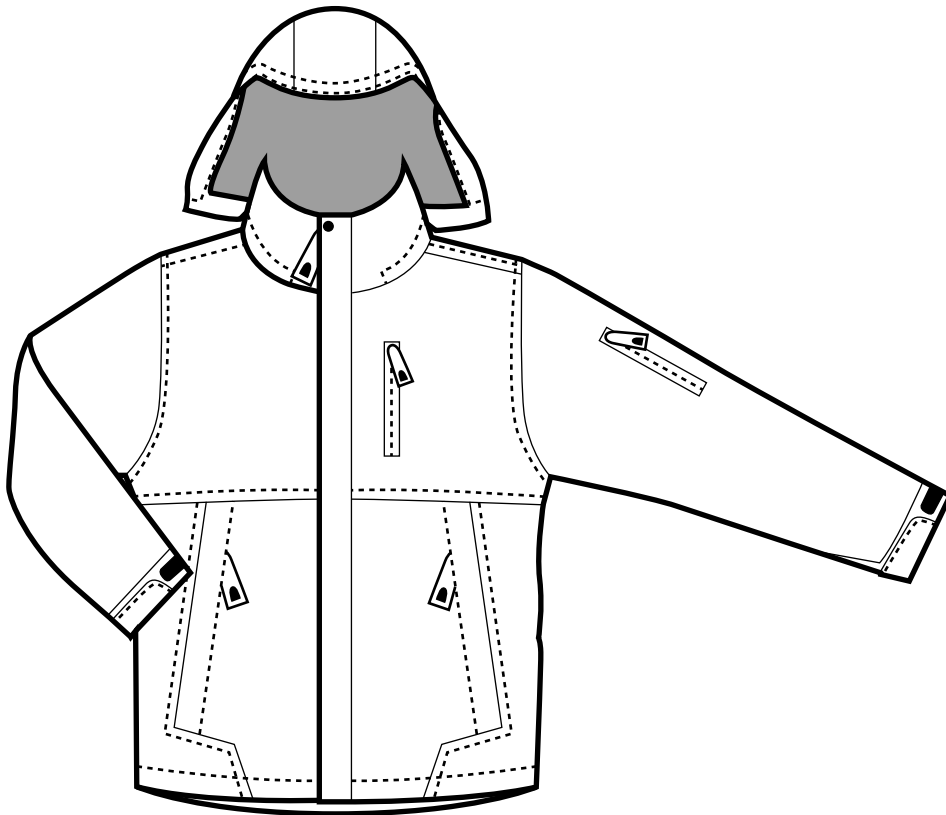


Fig. 10

(a) Give FOUR design requirements for the outdoor jacket shown in Fig. 10. Justify each requirement.

1 _____

2 _____

3 _____

4 _____

[4]

- (b) Describe TWO examples where ergonomics has influenced the design of the outdoor jacket shown in Fig. 10.
Use sketches and/or notes where appropriate.**

EXAMPLE 1

EXAMPLE 2

(c) Describe TWO ways in which the design of textile products can be legally protected.

1 _____

2 _____

[4]

(d) Explain TWO ways in which consumers can be assured that they are purchasing a quality textile product.

1 _____

2 _____

[4]

- (e) (i) State ONE SUITABLE SPECIFIC FIBRE for the outdoor jacket shown in Fig. 10. Give TWO performance characteristics that make the fibre suitable for this use.**

[3]

- (ii) An open ended zip is used to fasten the front of the outdoor jacket to be manufactured as a batch of 5. Describe, in detail, how to insert the zip fastener and secure the lining. Use a flowchart and/or annotated diagrams to support your answer.**

[8]

Question 8 Total [36]

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