

Wednesday 13 June 2012 – Afternoon

A2 GCE DESIGN AND TECHNOLOGY

F524/01 Product Design: Component 1

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:

- A calculator may be used

Duration: 1 hour



Candidate forename		Candidate surname	
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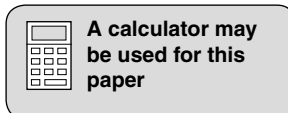
Centre number							Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB 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. Make sure you know what you have to do before starting your answer.
- Do **not** write in the bar codes.
- The discuss question will be used to assess your 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.
- This document consists of **40** pages. Any blank pages are indicated.



1 Built Environment and Construction

Fig. 1 shows a pre-fabricated trussed rafter to be used as part of the roof structure of a house.

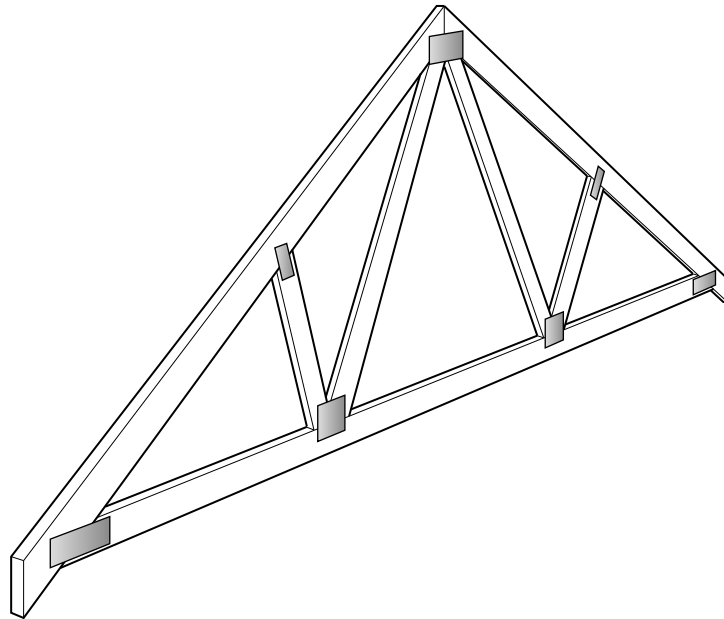


Fig. 1

(a) Give **four** justified design requirements for a pre-fabricated trussed rafter of the type shown in Fig. 1.

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(b) Describe **two** steps of a risk assessment.
Use **one** specific example from the built environment and construction industry to support your answer.

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(c) Describe, using **two** examples, where product labelling is used to protect consumers.

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(d) Explain why **non-destructive** testing procedures are used in product design.
Include details of a specific example for this testing procedure.

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- (e) (i) State a **suitable specific material** for the trussed rafter shown in Fig. 1.
Give **two** properties or characteristics that make the material suitable for this use.

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- (ii) Describe, in detail, how a trussed rafter **roof** would be constructed to achieve stability and resist buckling.
Use a flow chart and/or annotated diagrams to support your answer.

[9]

2 Engineering

Fig. 2 shows one section of a cycle rack.

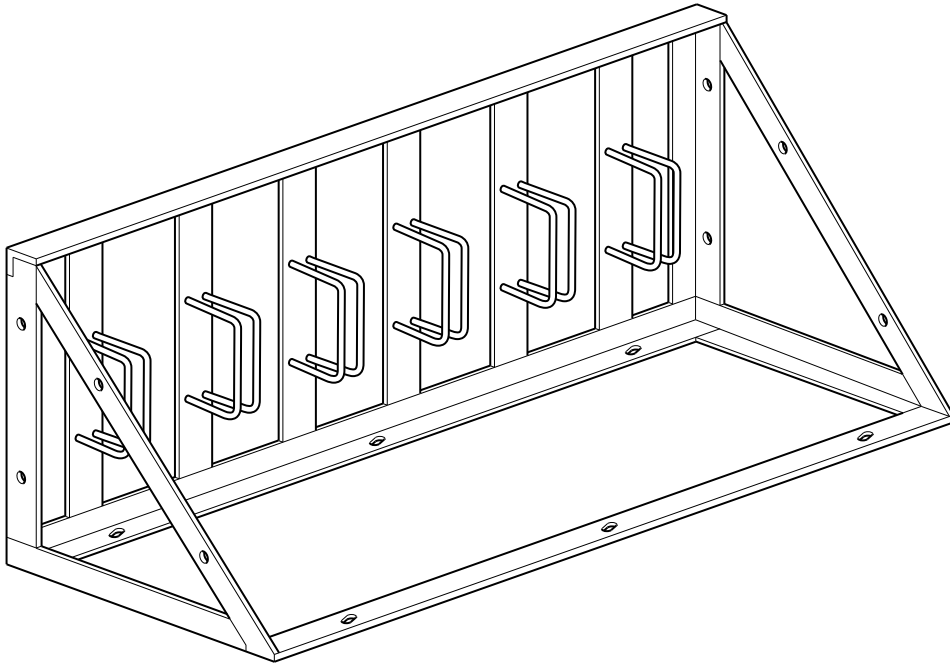


Fig. 2

(a) Give **four** justified design requirements for a cycle rack section of the type shown in Fig. 2.

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(b) Describe **two** steps of a risk assessment.
Use **one** specific example from the engineering industry to support your answer.

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(c) Describe, using **two** examples, where product labelling is used to protect consumers.

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(d) Explain why **non-destructive** testing procedures are used in product design.
Include details of a specific example for this testing procedure.

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(e) Fig. 3 shows two views of a wheel support from the cycle rack shown in Fig. 2.

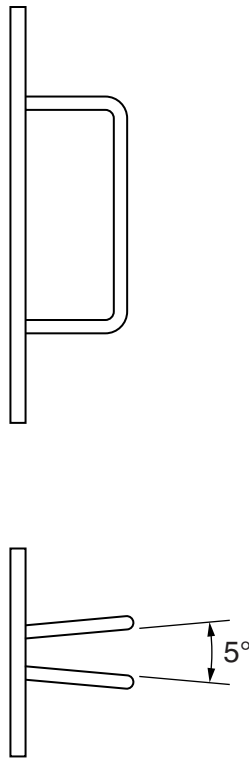


Fig. 3

(i) State a **suitable specific material** for the wheel support shown in Fig. 3. Give **two** properties or characteristics that make the material suitable for this use.

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- (ii)** Describe, in detail, how the wheel support shown in Fig. 3 would be manufactured as a batch of 150.

Give details of any special tooling and quality control checks that would be used.

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

[9]

3 Food

Fig. 4 shows a packaged ready meal.



Fig. 4

(a) Give **four** justified design requirements for a packaged ready meal of the type shown in Fig. 4.

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- 4 [4]

(b) Describe **two** steps of a risk assessment.
Use **one** specific example from the food industry to support your answer.

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- [4]

(c) Describe, using **two** examples, where product labelling is used to protect consumers.

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(d) Explain why **non-destructive** testing procedures are used in product design. Include details of a specific example for this testing procedure.

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(e) (i) Beef is an excellent source of iron in the diet. State **one** other specific food which contains iron. Give **two** functions of iron in the diet.

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- (ii) Describe, in detail, ways in which tough meat could be made tender. Include details of the changes of structure of the meat during the tenderising process. Use a flow chart and/or annotated diagrams to support your answer.

4 Graphic Products

Fig. 5 shows a wine bottle carrier.



Fig. 5

(a) Give **four** justified design requirements for a wine bottle carrier of the type shown in Fig. 5.

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(b) Describe **two** steps of a risk assessment.
Use **one** specific example from the graphics industry to support your answer.

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(c) Describe, using **two** examples, where product labelling is used to protect consumers.

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(d) Explain why **non-destructive** testing procedures are used in product design.
Include details of a specific example for this testing procedure.

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- (e) (i) State a **suitable specific material** for a wine bottle carrier of the type shown in Fig. 5. Give **two** properties or characteristics that make the material suitable for this use.

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- (ii) Describe, in detail, how the carrier would be manufactured as a production run of 10,000. The carrier has a crash base. Include details of the net (development) in your answer. Use a flow chart and/or annotated diagrams to support your answer.

[9]

5 Manufacturing

Fig. 6 shows part of a point-of-sale display for bottles of perfume.

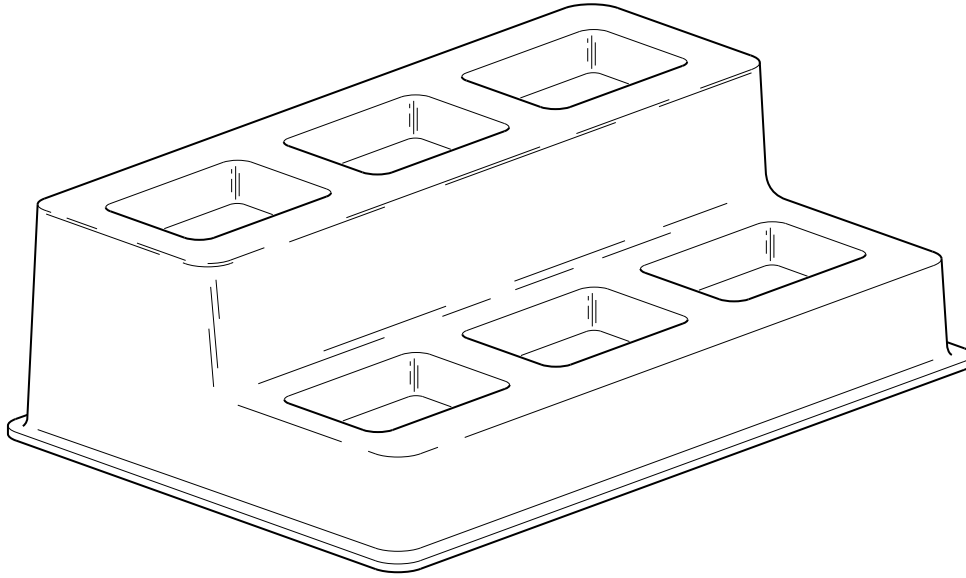


Fig. 6

(a) Give **four** justified design requirements for a point-of-sale display of the type shown in Fig. 6.

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(b) Describe **two** steps of a risk assessment.
Use **one** specific example from the manufacturing industry to support your answer.

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(c) Describe, using **two** examples, where product labelling is used to protect consumers.

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(d) Explain why **non-destructive** testing procedures are used in product design.
Include details of a specific example for this testing procedure.

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- (e) (i) State a **suitable specific material** for the point of sale display shown in Fig. 6.
Give **two** properties or characteristics that make the material suitable for this use.

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- (ii) Describe, in detail, how the point of sale display would be manufactured as a batch of 500.
Give details of any special tooling and quality control checks that would be used.
Use a flow chart and/or annotated diagrams to support your answer.

6 Resistant materials

Fig. 7 shows a scoop used in a sweet shop.

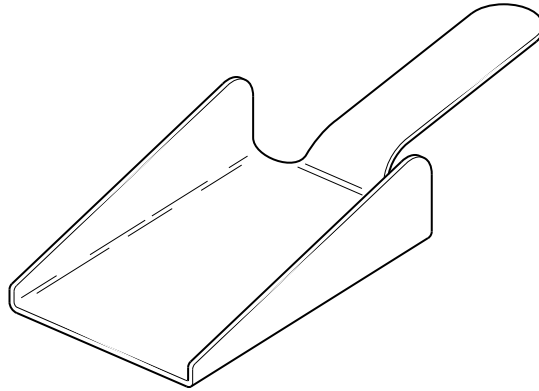


Fig. 7

(a) Give **four** justified design requirements for a scoop of the type shown in Fig. 7.

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(b) Describe **two** steps of a risk assessment.
Use **one** specific example to support your answer.

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(c) Describe, using **two** examples, where product labelling is used to protect consumers.

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(d) Explain why **non-destructive** testing procedures are used in product design. Include details of a specific example for this testing procedure.

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(e) (i) State a **suitable specific material** for a scoop of the type shown in Fig. 7. Give **two** properties or characteristics that make the material suitable for this use.

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- (ii) Describe, in detail, how the scoop shown in Fig. 7 would be manufactured as a batch of 250.
Include details of any jigs and/or formers used.
Use a flow chart and/or annotated diagrams to support your answer.

7 Systems and Control

Fig. 8 shows an LED head torch.

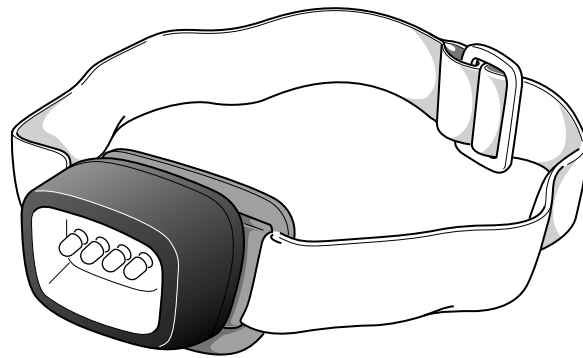


Fig. 8

(a) Give **four** justified design requirements for an LED head torch of the type shown in Fig. 8.

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(b) Describe **two** steps of a risk assessment.
Use **one** specific example from systems and control to support your answer.

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(c) Describe, using **two** examples, where product labelling is used to protect consumers.

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(d) Explain why **non-destructive** testing procedures are used in product design. Include details of a specific example for this testing procedure.

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(e) (i) The LED head torch shown in Fig. 8 contains a printed circuit board which uses surface mount technology (SMT).

State what is meant by SMT and give **two** reasons why it is used in products such as the LED head torch.

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- (ii) The LED head torch shown in Fig. 8 has a flashing function so that it can be used as a warning beacon.
Draw and label a circuit diagram of a suitable circuit to flash an LED at a controlled rate.
Indicate, on your diagram, how the flash rate can be adjusted.

8 Textiles

Fig. 9 shows a winter coat.



Fig. 9

(a) Give **four** justified design requirements for a coat of the type shown in Fig. 9.

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(b) Describe **two** steps of a risk assessment.
Use **one** specific example from the textiles industry to support your answer.

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(c) Describe using **two** examples where product labelling is used to protect customers.

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- (d) Explain why **non-destructive** testing procedures are used in product design. Include details of a specific example for this testing procedure.

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- (e) (i) State a **suitable specific fibre** for the coat shown in Fig. 9. Give **two** properties or characteristics that make the fibre suitable for this use.

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- (ii) Describe, in detail, how the buttonholes shown on the coat in Fig. 9 are produced and how the buttons are attached. The coats are manufactured as a batch of 5000. Use a flow chart and/or annotated diagrams to support your answer.

[9]

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