OCR
RECOGNISING ACHIEVEMENT

Advanced GCE

DESIGN AND TECHNOLOGY

Unit F524: Product Design: Component 1

Specimen Paper

F524 QP

Morning/Afternoon

Time: 2 hours 30 minutes

This paper is to be taken with Component 2 in the same examination session of 2.5 hours.
Components 1 and 2 should both be available to condidates for the full 2.5 hour session.

Candidate Name	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- 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 the question carefully and make sure you know what you have to do before starting your answer.
- Write your answers in the spaces on the question paper.
- Use blue of black ink. Pencil may be used for diagrams only.
- Please note that the instruction 'discuss' denotes that you should:
  - identify **three** relevant issues/points raised by the question; [P]
  - explain why you consider **three** of these issues/points to be relevant; [Q]
  - Use **two** specific examples/evidence to support your answer. [S]
- The discuss question will be used to assess the quality of written communication.
- All dimensions are in millimetres.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part of question.
- The total number of marks for Component 1 is **[36]**.

[Turn Over

1. Built Environment and Construction

Fig. 1 shows a part elevation of a pre-fabricated trussed rafter roof.

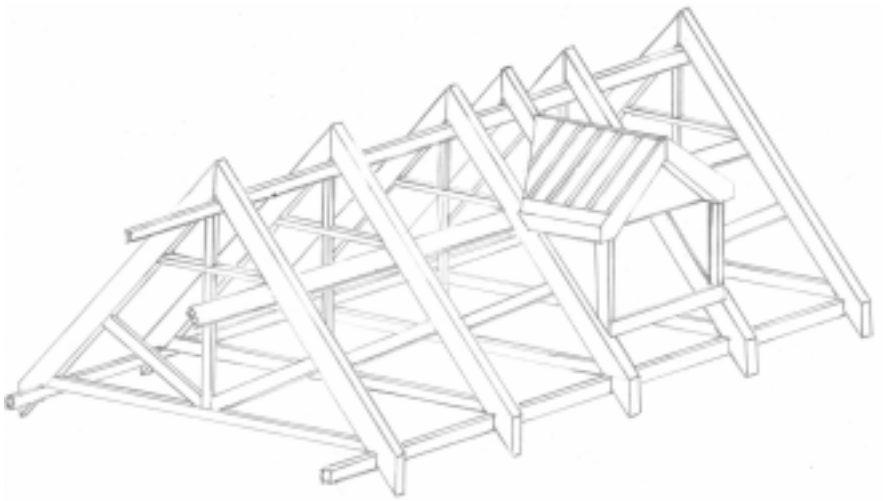


Fig. 1

(a) Give **four** justified design criteria that are required **before** the **manufacture** of a trussed rafter can commence.

(i).....

.....**[1]**

(ii).....

.....**[1]**

(iii).....

.....**[1]**

(iv).....

.....**[1]**

(b) Describe **two** examples of how modelling can be used in the design of a trussed rafter.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(c) Describe **two** quality control checks that may be carried out **during** the **manufacture** of a trussed rafter.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(d) Explain **two** benefits to the builder of using standardised trussed rafters for the production of a roof.

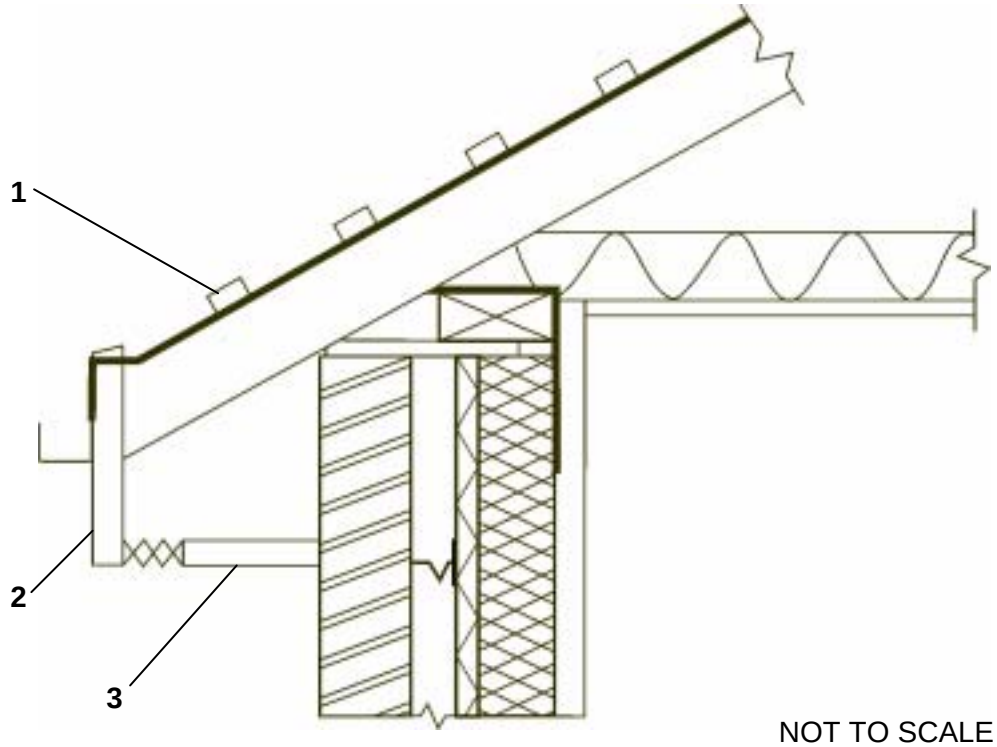
(i).....

.....**[2]**

(ii).....

.....**[2]**

Fig. 2 shows a section through the eaves detail of a roof.



NOT TO SCALE

Fig. 2

(e) Choose **one** of the numbered parts shown in **Fig. 2**.

Chosen Part .....

(i) State a suitable material for the part you have chosen.

Material.....**[1]**

(ii) Give **two** properties or characteristics that make the material suitable for this use.

.....

.....**[1]**

.....

.....**[1]**

(f) Describe, in detail, how a trussed rafter roof would be constructed to achieve stability/resist buckling. Use annotated sketches to support your answer.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....**[9]**

(g) Discuss the issues relating to the thermal performance of a pitched roof.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[8]**

FOR EXAMINER'S USE	
P	
Q	
S	

Question 1 Total [36]

2. Engineering

Fig. 3 shows a self assembly computer desk.

Fig. 3

(a) Give **four** justified design requirements for the self assembly computer desk.

(i).....

.....**[1]**

(ii).....

.....**[1]**

(iii).....

.....**[1]**

(iv).....

.....**[1]**

(b) Describe **two** examples of how modelling can be used in the design of self assembly computer desk.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(c) Describe **two** quality control checks that may be carried out **during** the **manufacture** of the self assembly computer desk shown in **Fig. 3**.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(d) Explain **two** benefits to the manufacturer of using standardised components in the production of the self assembly computer desk.

(i).....

.....**[2]**

(ii).....

.....**[2]**

The self assembly computer desk is to be produced "Flat Pack" using either Frame Connectors (Barrel bolt) or Cam Fittings.

Fig. 4 shows examples of both types of fittings.

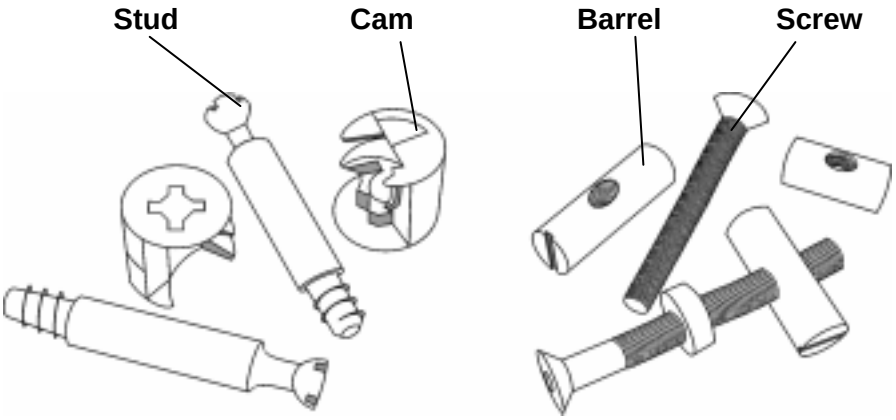


Fig. 4

(e) Choose **one** of the components shown in **Fig. 4**:

Chosen Component .....

(i) State a suitable material for the component you have chosen.

Material .....**[1]**

(ii) Give **two** properties or characteristics that make the material suitable for this use.

.....

.....**[1]**

.....

.....**[1]**

(f) Describe, in detail, how the part you have chosen would be manufactured. Use annotated sketches to support your answer.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....**[9]**

(g) Discuss the issues that determine the commercial success of an engineered product.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[8]**

FOR EXAMINER'S USE	
P	
Q	
S	

Question 2 Total [36]

3. Food

Fig. 5 shows a chilled food product.

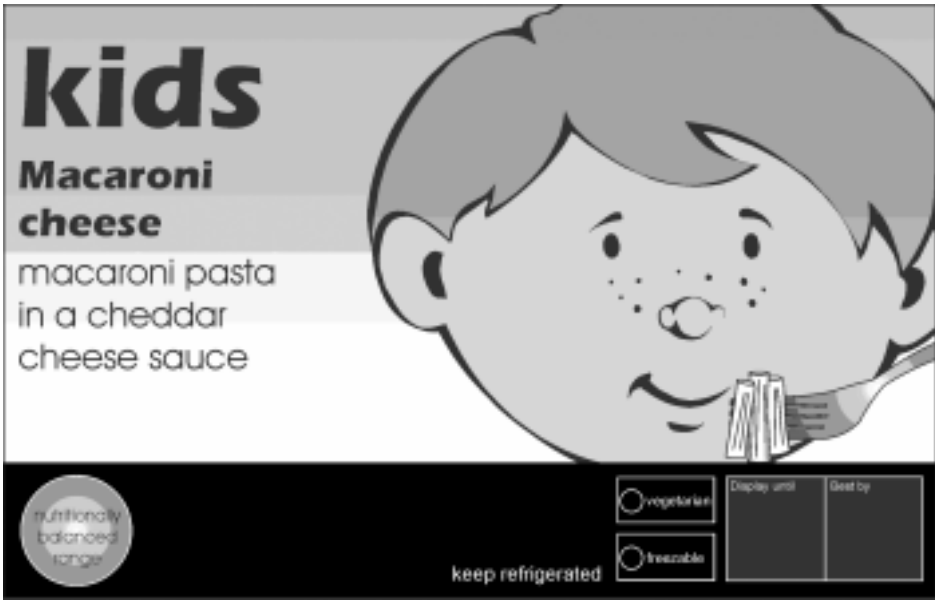


Fig. 5

(a) Give **four** justified design requirements for the chilled food product.

(i).....

.....**[1]**

(ii).....

.....**[1]**

(iii).....

.....**[1]**

(iv).....

.....**[1]**

(b) Describe **two** examples of how modelling can be used in the design of a chilled food product.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(c) Describe **two** quality control checks that may be carried out **during** the **manufacture** of the chilled food product shown in **Fig. 5**.

(i) .....

.....**[2]**

(ii) .....

.....**[2]**

(d) Explain **two** benefits to the manufacturer of using standardised components in the production of a chilled food product.

(i) .....

.....**[2]**

(ii) .....

.....**[2]**

(e) The chilled food product is packaged in a sealed container.

(i) State a suitable material for the container.

Material .....**[1]**

(ii) Give **two** properties or characteristics that make the material suitable for this use.

.....

.....**[1]**

.....

.....**[1]**

(f) Describe, in detail, how the cheese sauce in the chilled food product would have been thickened by gelatinisation.

Use annotated sketches to support your answer.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....**[9]**

(g) Discuss the issues that determine the commercial success of a food product.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[8]**

FOR EXAMINER'S USE	
P	
Q	
S	

Question 3 Total [36]

4. Graphic Products

Fig. 6 shows two free standing point of sale display units (POSD).

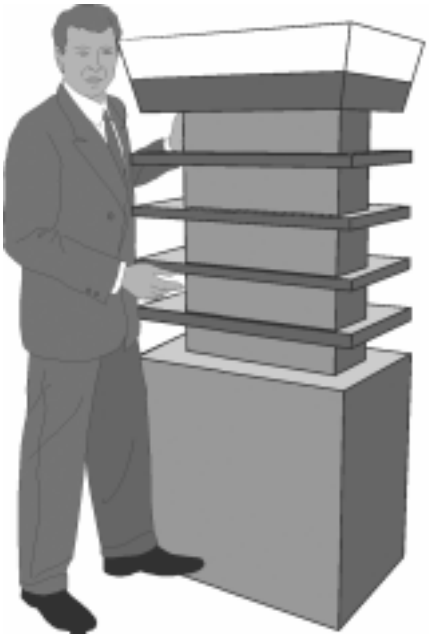


Fig. 6(a)

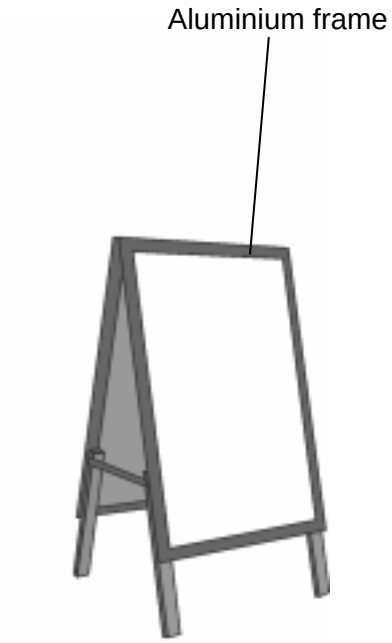


Fig. 6(b)

(a) Give **four** justified design requirements for the POSD shown in **Fig. 6(b)**.

(i).....

.....**[1]**

(ii).....

.....**[1]**

(iii).....

.....**[1]**

(iv).....

.....**[1]**

(b) Describe **two** examples of how modelling can be used in the design of the POSD shown in **Fig. 6(b)**.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(c) Describe **two** quality control checks that may be carried out **during** the **manufacture** of the POSD shown in **Fig. 6(a)**.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(d) Explain **two** benefits to the manufacturer of using standardised components in the production of POSDs.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(e) The POSD shown in **fig. 6(a)** above is made from a bleached faced corrugated card.

(i) Give **one** reason why bleached faced corrugated card is suitable for the POSD.

.....

.....**[1]**

(ii) State **two** environmental drawbacks with using bleached faced corrugated card.

.....

.....**[1]**

.....

.....**[1]**

(f) The POSD in **fig.6(a)** has been printed by Offset Lithography.

Describe, in detail, the complete process of Offset Lithography.

Use Annotated sketches to support your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[9]**

(g) Discuss the issues that influence the design of a POSD.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[8]**

FOR EXAMINER'S USE	
P	
Q	
S	

Question 4 Total [36]

5 Manufacturing

Fig. 7 shows a push-along toy.

Fig. 7

(a) Give **four** justified design requirements for the push-along toy.

(i).....

.....**[1]**

(ii).....

.....**[1]**

(iii).....

.....**[1]**

(iv).....

.....**[1]**

(b) Describe **two** examples of how modelling can be used in the design of a push-along toy.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(c) Describe **two** quality control checks that may be carried out **during** the **manufacture** of the push-along toy shown in **Fig. 7**.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(d) Explain **two** benefits to the manufacturer of using standardised components in the production of the push-along toy.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(**e)** Fig.8 shows construction details of the push-along toy.

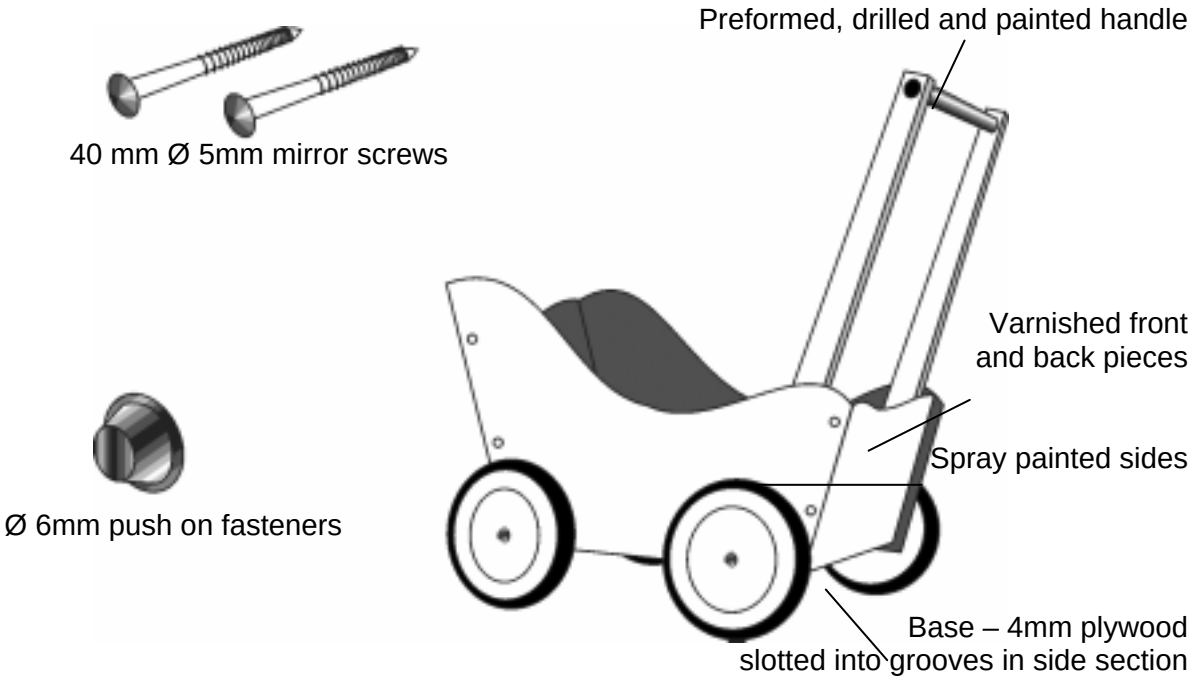


Fig. 8

Produce a fully detailed manufacturing plan for the preparation, sequential assembly and finishing of the push-along toy using the following information.

- All parts and components are “bought in” prior to manufacture of the push-along toy.
- The sides, front and back sections are solid beech and will require grooving, drilling and a finish applied prior to assembly.
- The wheels are held in place on 6mm steel axles by push on fasteners.

You should include the quality control checks you identified in part **(c)** of this question.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[12]

(f) Discuss the issues that determine the commercial success of a manufactured product.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[8]**

FOR EXAMINER'S USE	
P	
Q	
S	

Question 5 Total [36]

6 Resistant materials

Fig. 9 shows a push-along toy.

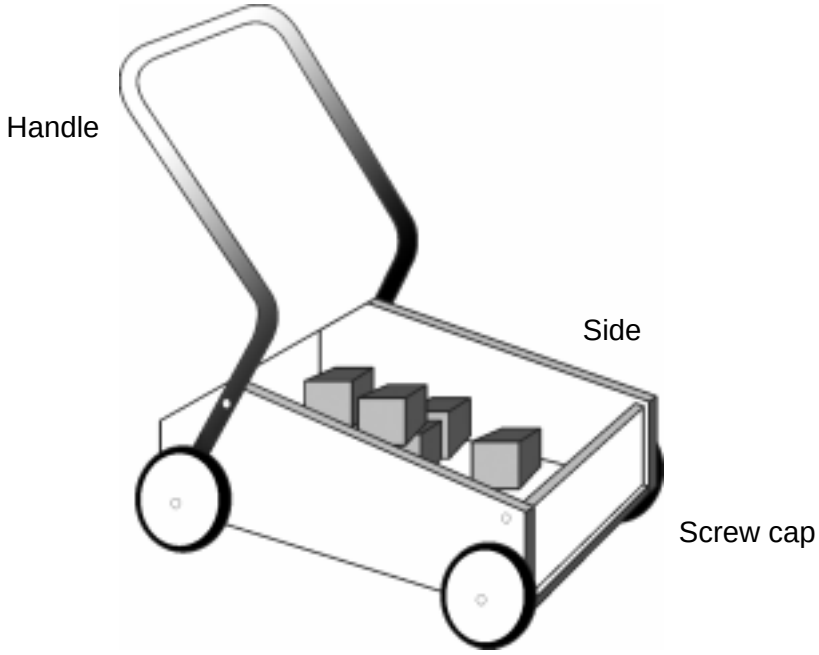


Fig. 9

(a) Give **four** justified design requirements for the push-along toy.

(i).....

.....**[1]**

(ii).....

.....**[1]**

(iii).....

.....**[1]**

(iv).....

.....**[1]**

(b) Describe **two** examples of how modelling can be used in the design of the push-along toy.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(c) Describe **two** quality control checks that may be carried out **during** the **manufacture** of the push-along toy shown in **Fig.9**.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(d) Explain **two** benefits to the manufacturer of using standardised components in the production of the push-along toy.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(e) Fig. 10 shows parts of the push-along toy.

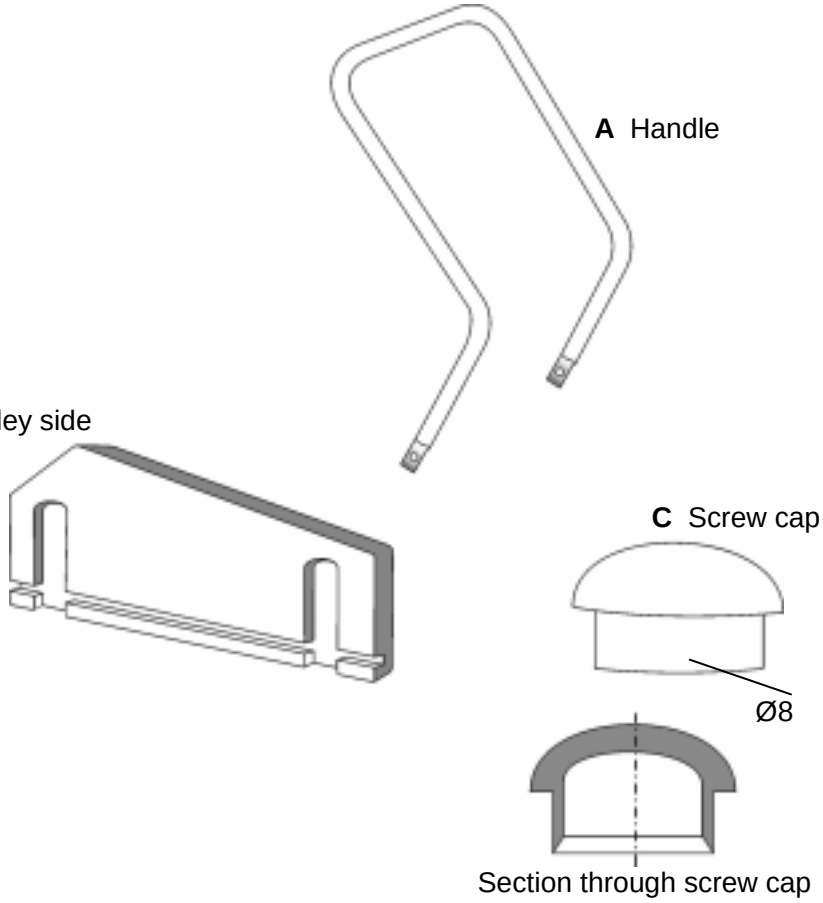


Fig. 10

Choose **one** of the parts shown in **Fig. 10**:

Chosen Part .....

(i) State a suitable material for the part you have chosen

Material .....**[1]**

(ii) Give two properties or characteristics that make the material suitable for this use.

.....

.....**[1]**

.....

.....**[1]**

(iii) Describe, in detail, how the part you have chosen would be manufactured.

Use annotated sketches to support your answer.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....**[9]**

(f) Discuss the issues that determine the commercial success of a product.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[8]**

FOR EXAMINER'S USE	
P	
Q	
S	

Question 6 Total [36]

7. Systems and Control

Fig. 11 shows a washing machine.

Fig. 11

(a) Give **four** justified design requirements for a washing machine.

(i).....

.....**[1]**

(ii).....

.....**[1]**

(iii).....

.....**[1]**

(iv).....

.....**[1]**

(b) Describe **two** examples of how simulation software can be used in the design of a washing machine circuit.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(c) Describe **two** quality control checks that may be carried out during the **manufacture** of the washing machine shown in **Fig. 11**.

(i) .....

.....**[2]**

(ii) .....

.....**[2]**

(d) Explain **two** benefits to the manufacturer of using standardised components in the production of a washing machine.

(i) .....

.....**[2]**

(ii) .....

.....**[2]**

(e) **(i)** Explain why the washing machine water heater must be part of a closed-loop system with feedback.

.....

.....

.....

.....**[4]**

(ii) Name a suitable component to measure the water temperature.

.....

.....**[1]**

(iii) Using the minimum number of 2-input NAND gates, design a logic circuit which will send a positive signal to the control circuit and so allow the washing machine to start if:

- the door is closed;
- the water is turned on;
- the start button is pressed.

Door Closed Sensor -

- Output signal

Water ON -

Start Button - **[4]**

(iv) Produce a truth table for the circuit you have designed.

.....

.....

.....**[3]**

(f) Discuss the issues that determine the commercial success of an automated product.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[8]**

FOR EXAMINER'S USE	
P	
Q	
S	

Question 7 Total [36]

8. Textiles

Fig. 12 shows a baseball cap.

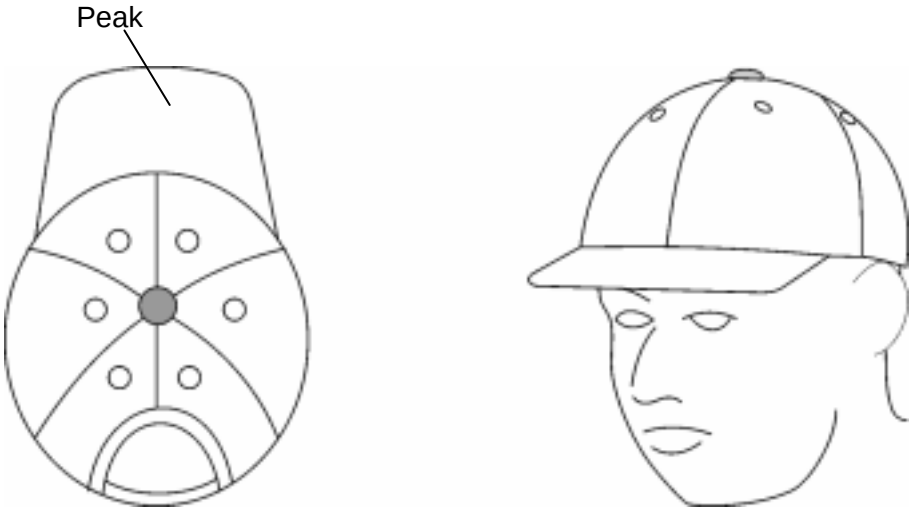


Fig. 12

(a) Give **four** justified design requirements for the baseball cap.

(i).....

.....**[1]**

(ii).....

.....**[1]**

(iii).....

.....**[1]**

(iv).....

.....**[1]**

(b) Describe **two** examples of how modelling can be used in the design of a baseball cap.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(c) Describe **two** quality control checks that may be carried out **during** the **manufacture** of the baseball cap shown in **Fig. 12**.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(d) Explain **two** benefits to the manufacturer of using standardised components in the production of the baseball cap.

(i).....

.....**[2]**

(ii).....

.....**[2]**

(e) **(i)** State a suitable fibre or fabric for the baseball cap.

Fibre or Fabric.....**[1]**

(ii) Give two properties or characteristics that make the material suitable for this use.

.....

.....**[1]**

.....

.....**[1]**

(iii) Describe the order of manufacture of the baseball cap.

Use annotated sketches to support your answer.

Include details of the pattern pieces used.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[9]**

(f) Discuss the implications of using smart and modern materials in textile products.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....**[8]**

FOR EXAMINER'S USE	
P	
Q	
S	

Question 8 Total [36]

BLANK PAGE

Advanced GCE

Design and Technology

Unit F524: Product Design; Component 2

Specimen Paper

F524 QP

Additional Materials: A3 sheets

INSTRUCTIONS TO CANDIDATES

- Answer **one** question **only** from Component 1 and **one** question **only** from component 2.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part of question.
- The total number of marks for Component 2 is **[54]**.

ADVICE TO CANDIDATES

Read each question carefully and make sure you know what you have to do before starting your answer.

This document consists of **5** printed pages and **3** blank pages.

This section assesses the abilities of candidates to make immediate design thinking responses to a given situation. It is intended to be a discriminator in identifying those candidates who can effectively use their experiences and knowledge in designing and making.

Question paper

The question paper consists of eight questions. Candidates will answer **one** question only on pre-printed OCR A3 sheets.

There is a total of 54 marks for the question. Each question will follow a common format and a generic mark scheme will be used for all questions. There will be one question for each of the eight focus areas:

- Built Environment and Construction;
- Engineering;
- Food;
- Graphic Products;
- Manufacturing;
- Resistant Materials;
- Textiles;
- Systems and Control.

Candidates will be required to respond to a given design situation. They will start by producing a specification and then produce a range of developed ideas. The ideas must be innovative and consider manufacturing/construction techniques, materials and components and appropriate measurements. Ideas must be evaluated with reference to the specification and volume production. Sketches and appropriate annotation should be used to show a final developed outcome. Specific features must be identified along with justification for these choices. Candidates will be marked on their ability to communicate their ideas effectively.

Marks will be allocated as follows:

• 3 point specification	6
• Range of innovative ideas with development	33
• Final developed outcome	9
• Efficient communication	6
Total	54

Candidates will answer one question.

1. Built Environment and Construction

A large housing developer has purchased a plot of land for building a new estate on. A garage has been designed, but as yet no roof has been designed for it.

A roof design for the new garage is required.

Data

- Market research has indicated that there is a potential demand for an initial minimum of 5,000 products.

2. Engineering

A local engineering company who specialise in pressing and welding have inherited the production rights for the push-along toy shown in Component 1 Fig. 7.

A sheet steel version of the toy is required.

Data

- Welding must be the main method of construction.
- Market research has indicated that there is a potential demand for an initial minimum of 5,000 products.

3. Food

A big supermarket chain wants to introduce a new chilled food range, which will encourage young children to eat more healthily.

A healthy chilled food product, other than macaroni cheese, is required.

Data

- The product should be based around a theme that will attract young children.
- Market research has indicated that there is a potential demand for an initial minimum of 10,000 products.

4. Graphic Products

A big supermarket chain wants to introduce a new chilled food range, which will encourage young children to eat more healthily.

A free standing point of sale display unit (POSD) that will display the new food range is required.

Data

- The POSD must display a minimum of 20 meal packs.
- The POSD must be able to be flat packed for delivery to the supermarket.
- Market research has indicated that there is a potential demand for an initial minimum of 5,000 products.

5. Manufacturing

A manufacturing company wish to produce a range of multi-use children's toys.

A children's toy that can transform in some way to provide a different function is required.

Data

- The toy must be quick and easy to transform into its new function.
- Market research has indicated that there is a potential demand for an initial minimum of 5,000 products.

6. Resistant Materials

A chain of nurseries has decided to expand the age range that they accept by opening an "early years" section for children from 6 months to 2 years.

A product that will help the children to crawl or walk is required.

Data

- The product must be able to be folded away or easily disassembled for storage when not in use.
- Market research has indicated that there is a potential demand for an initial minimum of 5,000 products.

7. Systems and Control

A new company that specialises in replacing new washing machines for old ones has been set up. They have found it difficult to remove the old machines from customers' houses.

A product that will help to move washing machines is required.

Data

- The product must be able to safely move the washing machine from a house into the works van.
- Market research has indicated that there is a potential demand for an initial minimum of 5,000 products.

8. Textiles

A local nursery allows their "first steps" children to go outside to play in good weather.

A product, other than a baseball cap, that will protect the children from the sun when outside is required.

Data

- The product must be able to fit children from the ages of 1 to 3 years old.
- Market research has indicated that there is a potential demand for an initial minimum of 5,000 products.

[BLANK PAGE]

[BLANK PAGE]

[BLANK PAGE]

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced GCE

DESIGN AND TECHNOLOGY F524

Unit 4: Product Design; Component 1

Specimen Mark Scheme

The maximum mark for this paper is **[36]**.

Component 1		
1. Built environment and construction		
Question Number	**Answer**	**Marks**
(a)	**Give <u>four</u> justified design criteria that are required <u>before</u> the <u>manufacture</u> of a trussed rafter can commence.** **Four** justified design requirements: • The height and location of the building, possible reference to any unusual wind conditions; • the profile of the trussed rafter; • the span of the trussed rafter (overall wallplates or overall length of ceiling tie); • the pitch(s) of the roof; • the method and position of all supports; • the type or weight of roof tiles/covering; • the size and position of any water tanks etc. supported by the trussed rafter; • the overhang of the rafters at the eaves; • the position of hatches, chimneys and other openings; • the type of preservative treatment if required; • the spacing of the trusses and special timber sizes if there is a need to match with existing construction.	**[1x4]**
(b)	**Describe <u>two</u> examples of how modelling can be used in the design of a trussed rafter.** **Two** examples clearly described: • 2D scale model established to determine the correct proportions and appropriate structural triangulation; • CAD model to apply/check the magnitude of tensile and compressive forces generated in the members; • 3D full size model on compression frame to test the integrity of all joints or to destruction i.e. stability.	**[2x2]**
(c)	**Describe <u>two</u> quality control checks that may be carried out <u>during</u> the <u>manufacture</u> of a trussed rafter.** **Two** checks clearly described: • Timber is of the required stress grading classification according to BS4978:1973; • joints between members are properly fitted; • metal connecting plates are of the correct size/position, fully pressed in place; • span, rise and pitch of the rafter match the requirements; • size of individual timber members correct; • no defects in timber i.e. excessive bowing, twisting, waney edge etc.	**[2x2]**

1. Built environment and construction		
Question Number	**Answer**	**Marks**
(d)	**Explain <u>two</u> benefits to the builder of using standardised trussed rafters for the production of a roof.** **Two** benefits clearly described: • Economy of site labour; • quicker to erect on site; • less waste of materials (40% less timber than a traditional roof); • no internal support is required from load-bearing partitions; • spans of up to 12 metres can be achieved; • relatively cheap to buy; • can be designed to very shallow pitches; • less space required on site for carpentry work areas or timber storage.	**[2x2]**
(e)	**Choose <u>one</u> of the numbered parts shown in Fig.2** **State a suitable material for the part you have chosen.** **Give <u>two</u> properties or characteristics that make the material suitable for this use.** Material could be – • Rough sawn timber possibly Spruce, Fir or Whitewood; • planed Square Edge timber possible Redwood or Whitewood; • exterior grade plywood. • pvc U **Two** appropriate properties/characteristics could be: For 1Durable • Can be easily fixed and cut; • economic in use; • Strength. For 2 In Redwood • As 1 plus machines easily giving a good finish and accepts paint etc; • in pvcU; • dimensionally stable; • flexes slightly to push fit; • no finish needs applying; • low maintenance; • does not split/splinter; For 3 In Exterior Plywood: • As 1 plus dimensionally stable and accepts a finish; • in pvcU as 2.	**[3x1]**

1. Built environment and construction		
Question Number	**Answer**	**Marks**
(f)	**Describe, in detail, how a trussed rafter roof would be constructed to achieve stability/resist buckling. Use annotated sketches to support your answer.** Processes identified. Quality of description and communication. • Temporary bracing; • lateral web bracing; • longitudinal bracing at node points; • chevron bracing for longer spans; • ceiling binders at node points; • use of galvanised steel truss clips; • vertical restraint metal strapping at the wall plate; • conforms to Approved Document A of Building Regulations; • bracing to achieve recommendations in BS5268: Part 3; • conform with manufacturer's recommendations; • trussed rafters not to be modified on site; • metal restraining straps used at gable walls.	**[6x1]** **[3x1]**
(g)	**Discuss the issues relating to the thermal performance of a pitched roof.** • Cold roof insulated roofs; • warm roof insulated roofs; • compliance with Approved Document L i.e.;0.2W/M2K for roofs without a loft; • 0.16W/M2K for roofs with a loft space; • reduced energy bills; • types of insulating material; • green issues; • ventilation within the roof space; • condensation within the roof space. P relevant points relating to the question. 1 mark per point max 3. Q quality of explanation of points. 1 mark per point max 3. S suitable use of examples/supporting evidence. 1 mark per point max 2.	**[8]**
	Question 1 Total	**[36]**

Component 1		
2. Engineering		
Question Number	**Answer**	**Marks**
(a)	**Give <u>four</u> justified design requirements for the self assembly computer desk.** **Four** justified design requirements. • The frame must be rigid to avoid movement when in use; • the desk must be robust to withstand the wear and tear of possible misuse; • all parts must be securely fixed to avoid the possibility of small parts coming loose; • the finish on the sides of the computer desk must be resistant to damage and marking; • a quality finish must be used to suit the office environment; • the desk must be at an appropriate height for the target age range to ensure that the user can push the computer into a comfortable and safe position; • the computer desk must be easy to assemble with the minimum of skills/tools; • a screwdriver/Allen key should be provided as part of the flat pack; • instruction sheet should be clear and easy to follow.	**[4x1]**
(b)	**Describe <u>two</u> examples of how modelling can be used in the design of self assembly computer desk.** **Two** examples clearly described. • Ideas for the computer desk can be modelled using CAD to explore a range of shapes; • 3D scale models can be used to check the overall proportions and test stability of the computer desk; • 2D models can be used to establish an appropriate shape for the sides and frames of the computer desk.	**[2x2]**
(c)	**Describe <u>two</u> quality control checks that may be carried out during the <u>manufacture</u> of the self assembly computer desk shown in Fig.2.** **Two** checks clearly described. • Dimensional check on parts, e.g. alignment of holes drilled to connect frame to top/sides; • correct and secure assembly of parts e.g., pressure applied to frame; • force testing random sample for welding strength of frame sections; • frame sections checked with jig or optical template for correct angles; • visual check on the quality of finish applied/colour consistency to frame/top/sides; • tooling check to ensure drilled holes are correct position and size.	**[2x2]**

2. Engineering		
Question Number	**Answer**	**Marks**
(d)	**Explain <u>two</u> benefits to the manufacturer of using standardised components in the production of the self assembly computer desk.** **Two** benefits clearly described. • Quality assured components; • choice of suppliers; • no need for additional manufacturing cells; • speed of production.	**[2x2]**
(e)	**The self assembly computer desk is to be produced "Flat Pack" using a combination of Cam Fittings (stud/cam) and Frame Connectors (barrel/screw).** **Fig. 2 shows the component parts of both types of fittings.** **Choose one of the component parts shown in Fig 4.** **State a suitable material for the component you have chosen.** **Give <u>two</u> properties or characteristics that make the material suitable for this use.** Correct material. Different details related to chosen material. Material could be: Frame Connectors (Barrel bolt) and/or Cam Fitting Bolt: Steel – Toughness and strength, low comparative cost, resistance to shear and thread stripping, readily available, capability of being manufactured to tight tolerances, simple design of component can be produced by different company than companion fitting. Barrel: Steel, stainless steel Cam: Zinc alloy, Aluminium alloy – ability to be cast into complex shapes, retains strength in thin sections, ability to resist twisting forces, self sealing (does not corrode), requires no finishing	**[1]** **[2x1]**
(f)	**Describe, in detail, how the part you have chosen would be manufactured. Use annotated sketches to support your answer.** Forming/shaping of chosen component for the details and understanding of process. Protection of chosen component for details and understanding.	**[0–6]** **[0–3]**

2. Engineering		
Question Number	**Answer**	**Marks**
(g)	**Discuss the issues that determine the commercial success of an engineered product.** • Effective marketing; • value for money; • celebrity usage/TV coverage; • quality of design and manufacture. P relevant points relating to the question. 1 mark per point max 3. Q quality of explanation of points. 1 mark per point max 3. S suitable use of examples/supporting evidence. 1 mark per point max 2.	**[8]**
	Question 2 Total	**[36]**

Component 1		
3. Food		
Question Number	**Answer**	**Marks**
(a)	**Give <u>four</u> justified design requirements for the chilled food product.** **Four** justified design requirements. • The product must be suitable to reheat in a microwave/ease, speed, safety; • the product must not contain nuts/allergies in children; • all the foods used must be fresh and good quality/to avoid food contamination; • the sauce must be smooth, creamy, good consistency, good flavour any similar sensory qualities; • the fat content should be below 6g per 100g/it will then be a lower in fat product, healthier; • the portion size must be suitable for a young child/sold as a child's meal therefore not a family size; • there must be sufficient cheese sauce to keep the product moist/easy to eat; • no more than 30% of the energy in the meal should be from fat; • must be suitable for a vegetarian/this will broaden the target market; • must be suitable to be frozen; • must have a shelf life of 4/5 days.	**[4x1]**
(b)	**Describe <u>two</u> examples of how modelling can be used in the design of a chilled food product.** **Two** examples clearly described. • Ideas for the product can be modelled using CAD to explore a range of pasta shapes; • testing and trailing (3D scale models) can be used to check the overall proportions and test sensory qualities; • nutritional modelling can be used to establish an appropriate nutritional balance.	**[2x2]**
(c)	**Describe <u>two</u> quality control checks that may be carried out <u>during</u> the <u>manufacture</u> of the chilled food product shown in Fig.5.** **Two** checks clearly described. • Accurate weights of ingredients/use electronic or computer controlled scales; • correct consistency of the cheese sauce/visual check; • accurate amount of cooking of the pasta to achieve correct texture/temperature control; • quantity control in the portions/computerised weighing; • portion neatly in the container/visual check.	**[2x2]**

3. Food		
Question Number	**Answer**	**Marks**
(d)	**Explain <u>two</u> benefits to the manufacturer of using standardised components in the production of a chilled food product.** **Two** benefits clearly described. • Quality assured components e.g. grated cheese/pasta shapes/seasonings; • choice of suppliers; • no need for additional manufacturing cells; • speed of production.	**[2x2]**
(e)	**The chilled food product is packaged in a sealed container** **State a suitable material for the container.** **Give <u>two</u> properties or characteristics that make the material suitable for this use.** Material An appropriate specific material could be: • PET (polyester); • PP (polypropylene). **Two** appropriate properties or characteristics could be: • High melting point which makes it suitable for microwaves; • rigid shape to protect the food; • can be frozen; • can be used as a film to seal the top.	**[1]** **[2x1]**
(f)	**Describe, in detail, how the cheese sauce in the chilled food product would have been thickened by gelatinisation.** **Use annotated sketches to support your answer.** • Starch grains do not dissolve in liquid. They form a suspension; • the suspension of starch in water is heated; • stirring or agitating the liquid keeps the starch particles suspended; • if the suspension is not stirred the particles sink to the bottom and stick together to form lumps; • when the liquid reaches 60 degrees C the starch grains begin to absorb liquid and swell; • at 80 degrees C the grains break open and release long chain molecules of starch, making the mixture thick and viscous. This is the point of gelatinisation; • gelatinisation is completed when the liquid reaches 100 degrees C. The starch molecules form a network with the water enclosed in its mesh; • the thickened liquid now forms a gel. On cooling the gel solidifies;	

3. Food		
Question Number	**Answer**	**Marks**
(f) Cont'd	• the strength of the gel depends on the proportion of starch to liquid. The more starch the thicker the gel; • the proportion of amylase in the starch aids gelling but it is less stable and molecules are likely to unwind and the gel become like a pulpy sponge. Stages identified. Max 6 Quality of description and communication. Max 3	**[9]**
(g)	**Discuss the issues that determine the commercial success of a food product.** • Effective marketing e.g. Special offers/free samples/tasting sessions in supermarkets; • value for money; • celebrity usage/TV coverage; • 'Healthy'/'new or fortified' foods; • quality of design and manufacture. P relevant points relating to the question. 1 mark per point max 3. Q quality of explanation of points. 1 mark per point max 3. S suitable use of examples/supporting evidence. 1 mark per point max 2.	**[8]**
	Question 3 Total	**[36]**

Component 1		
4. Graphic products		
Question Number	**Answer**	**Marks**
(a)	**Give <u>four</u> justified design requirements for the POSD shown in Fig.6(b).** • Stability; • visibility; • water proof; • lightweight; • folding/knock down; • easy to change poster.	**[4x1]**
(b)	**Describe <u>two</u> examples of how modelling can be used in the design of the POSD shown in Fig.6(b).** • Testing for stability; • folding mechanisms; • display systems; • size.	**[2x2]**
(c)	**Describe <u>two</u> quality control checks that may be carried out <u>during</u> the <u>manufacture</u> of the POSD shown in fig.6a.** • Any relating to printing, e.g. colour checks; • registration; • image quality; • checks relating to die cutting such as accuracy of cuts; • tearing.	**[2x2]**
(d)	**Explain <u>two</u> benefits to the manufacturer of using standardised components in the production of POSDs.** • Cost; • ability to use the same components on a range of products; • stock control; • easier maintenance; • better customer support; • less support materials needed for products; • less training for staff.	**[2x2]**

4. Graphic products		
Question Number	**Answer**	**Marks**
(e)(i)	**The POSD shown in fig.6(a) above is made from a bleached faced corrugated card.** **Give <u>one</u> reason why bleached faced corrugated card is suitable for the POSD.** • bleached card gives a strong white surface which improves print quality, such as vibrancy of colours, definition, contrast.	**[1]**
(e)(ii)	**State <u>two</u> environmental drawbacks with using bleached faced corrugated card.** • Potential pollution from disposal of bleach; • toxic fumes during production/use of bleaches.	**[2x1]**
(f)	**The POSD in fig.6a has been printed by Offset Lithography. Describe, in detail, the complete process of Offset Lithography. Use annotated sketches to support your answer.** 1 mark for each Offset lithography - • Origination; • use of CAD/layout/design; • image ready artwork design; • image setting (adding printer's marks); • colour separation; • production of films for each colour; • quality control checks of images; • films attached to press x4 (5 or 6); • inks/pigments charged; • paper (web or sheet) loaded; • 1st run of press; • quality checks/registration/colour, (2); • trimming/cutting to size.	**[9]**

4. Graphic products		
Question Number	**Answer**	**Marks**
(g)	**Discuss the issues that influence the design of a POSD.** • Cost; • materials; • function; • size; • ergonomics; • aesthetics; • production process; • stability/weight; • images to be used; • end position/location. P relevant points relating to the question. 1 mark per point max 3. Q quality of explanation of points. 1 mark per point max 3. S suitable use of examples/supporting evidence. 1 mark per point max 2.	**[8]**
	Question 4 Total	**[36]**

Component 1		
5. Manufacturing		
Question Number	**Answer**	**Marks**
(a)	**Give <u>four</u> justified design requirements for the push-along toy.** For **four** justified design requirements. • The wheels must rotate freely to enable a child to easily manoeuvre the toy pram; • the toy pram must be robust to withstand the wear and tear of possible misuse by children; • all parts must be securely fixed to avoid the possibility of small parts coming loose and causing a choke hazard; • the finish on the sides of the toy pram must be resistant to damage and marking caused by misuse by child; • a non toxic finish must be used to avoid possibility of child chewing or sucking parts of the toy pram; • the handle must be at an appropriate height for the target age range to ensure that the user can push the toy pram in a comfortable and safe manner.	**[4x1]**
(b)	**Describe <u>two</u> examples of how modelling can be used in the design of a push-along toy.** **Two** examples clearly described. • Ideas for the toy pram can be modelled using CAD to explore a range of shapes for the handle; • 3D scale models can be used to check the overall proportions and test stability of the toy pram; • 2D models can be used to establish an appropriate shape for the sides of the toy pram.	**[2x2]**
(c)	**Describe <u>two</u> quality control checks that may be carried out during the <u>manufacture</u> of the push-along toy shown in Fig.7.** **Two** checks clearly described. • Dimensional check on parts, e.g. alignment of holes drilled to connect handle to sides; • correct and secure assembly of parts e.g., pressure applied to wheels; • visual check on the quality of finish applied/colour consistency; • tooling check to ensure routed grooves are correct depth and width to ensure tight fit.	**[2x2]**

5. Manufacturing		
Question Number	**Answer**	**Marks**
(d)	**Explain <u>two</u> benefits to the manufacturer of using standardised components in the production of the push-along toy.** **Two** benefits clearly described. • Quality assured components; • choice of suppliers; • no need for additional manufacturing cells; • speed of production.	**[2x2]**
(e)	**Fig.8 shows construction details of the push-along toy.** **Produce a fully detailed manufacturing plan for the preparation, sequential assembly and finishing of the push-along toy using the following information.** • **All parts and components are "bought in" prior to manufacture of the push-along toy;** • **the sides, front and back sections are solid beech and will require grooving, drilling and a finish applied prior to assembly;** • **the wheels are held in place on 6mm steel axles by push on fasteners.** **You should include the quality control checks you identified in part (c) of this question.** Candidates could respond using any method. Written, table, step by step, flow chart etc.	**[12]**
(f)	**Discuss the issues that determine the commercial success of a manufactured product.** • Effective marketing. • value for money; • celebrity usage/TV coverage; • quality of design and manufacture. P relevant points relating to the question. 1 mark per point max 3 Q quality of explanation of points. 1 mark per point max 3 S suitable use of examples/supporting evidence. 1 mark per point max 2	**[8]**
	Question 5 Total	**[36]**

Component 1		
6. Resistant materials		
Question Number	**Answer**	**Marks**
(a)	**Fig. 9 shows a push-along toy.** **Give <u>four</u> justified design requirements for the push-along toy.** **Four** justified design requirements. • The wheels must rotate freely to enable a child to easily manoeuvre the trolley; • the trolley must be robust to withstand the wear and tear of possible misuse by children; • all parts must be securely fixed to avoid the possibility of small parts coming loose and causing a choke hazard; • the finish on the sides of the trolley must be resistant to damage and marking caused by blocks being thrown in; • a non toxic finish must be used to avoid possibility of child chewing or sucking parts of the trolley; • the handle must be at an appropriate height for the target age range to ensure that the user can push the trolley in a comfortable and safe manner.	**[4x1]**
(b)	**Describe <u>two</u> examples of how modelling can be used in the design of the push-along toy.** **Two** examples clearly described. • Ideas for the trolley can be modelled using CAD to explore a range of shapes for the handle; • 3D scale models can be used to check the overall proportions and test stability of the trolley; • 2D models can be used to establish an appropriate shape for the sides of the trolley.	**[2x2]**
(c)	**Describe <u>two</u> quality control checks that may be carried out during the <u>manufacture</u> of the push-along toy shown in Fig.1.** **Two** checks clearly described. • Dimensional check on parts, e.g. alignment of holes drilled to connect handle to sides; • correct and secure assembly of parts e.g., pressure applied to wheels; • visual check on the quality of finish applied/colour consistency; • tooling check to ensure routed grooves are correct depth and width to ensure tight fit.	**[2x2]**

6. Resistant materials		
Question Number	**Answer**	**Marks**
(d)	**Explain <u>two</u> benefits to the manufacturer of using standardised components in the production of the push-along toy.** **Two** benefits clearly described. • Quality assured components; • choice of suppliers; • no need for additional manufacturing cells; • speed of production.	**[2x2]**
(e)(i)	**Fig.10 shows parts of the push-along toy.** **Choose one of the parts shown in Fig.10:** **State a suitable material for the part you have chosen and give <u>two</u> properties or characteristics that make the material suitable for this use.** An appropriate specific material could be: • for part A mild steel tube aluminium tube other appropriate • for part B plywood mdf beech other appropriate • for part C HDPE Polyproplene other appropriate	**[1]**
(e)(ii)	**Two** appropriate properties or characteristics could be: • for part A will resist force of child pushing without deforming can be easily formed in required shape accepts high quality finish other appropriate • for part B machines easily giving a good finish dimensionally stable does not split/splinter other appropriate • for part C flows easily when molten/ suitable for injection moulding flexes slightly to enable push fit can be coloured as required other appropriate	**[2x1]**

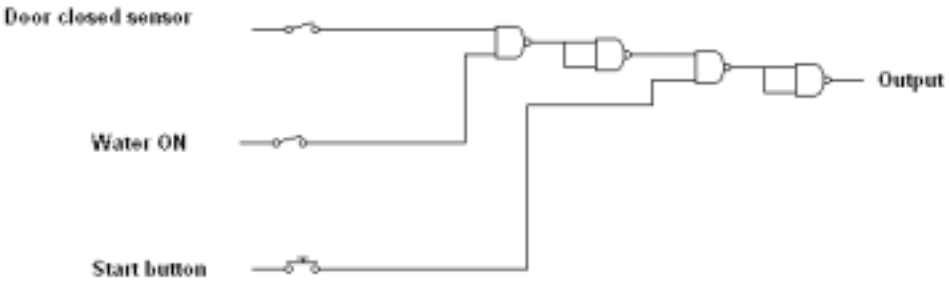
6. Resistant materials		
Question Number	**Answer**	**Marks**
(e)(iii)	**Describe, in detail, how the part you have chosen would be manufactured.** **Use annotated sketches to support your answer.** For A • Mark out, cut to length; • bend top curves with pipe bender; • bend other curves with jig; • crimp ends/braze? • drill; • shape, finish. Stages identified. max 6 Quality of description and communication. max 3 For B • Mark out using template; • cut groove, router, plough plane; • cut slots, forstner, router; • profile edges, plane spindle moulder; • drill holes; • finish. Stages identified. max 6 Quality of description and communication. max 3 For C • Prepare mould; • heat mould; • heat plastic; • inject; • cool; • eject; • remove sprue. Stages identified. max 6 Quality of description and communication. max 3	**[9]**

6. Resistant materials		
Question Number	**Answer**	**Marks**
(f)	**Discuss the issues that determine the commercial success of a product**. • Effective marketing; • value for money; • celebrity usage/TV coverage; • quality of design and manufacture. P relevant points relating to the question. 1 mark per point max 3. Q quality of explanation of points. 1 mark per point max 3. S suitable use of examples/supporting evidence. 1 mark per point max 2.	**[8]**
	Question 6 Total	**[36]**

Component 1		
7. Systems and controls		
Question Number	**Answer**	**Marks**
(a)	**Fig.11 shows a washing machine.** **Give <u>four</u> justified design requirements for a washing machine.** **Four** justified design requirements. • The washing machine must have a compartment for powder/liquids that is conveniently placed and so easy to use; • all electrical parts must be isolated from contact with water for safety purposes; • the door must seal effectively to ensure no water escapes from the washing machine; • the door must be interlocked with the controls to ensure it cannot be opened when the machine is operating and so be safe to use; • front access to the filter/pump compartment for ease of cleaning; • controls should be ergonomically shaped and positioned to ensure ease of use by the consumer.	**[4x1]**
(b)	**Describe <u>two</u> examples of how simulation software can be used in the design of a washing machine circuit.** **Two** examples clearly described. • Circuits can be designed and altered without further cost; • circuits can be automatically converted to printed circuit boards; • circuits can be tested for correct operation and modified or altered without any further costs.	**[2x2]**
(c)	**Describe <u>two</u> quality control checks that may be carried out during the <u>manufacture</u> of the washing machine shown in Fig.11.** **Two** checks clearly described. • Dimensional check on parts, e.g. alignment of holes drilled to connect sides to body; • correct and secure assembly of parts e.g., rotation of drum; • visual check on the quality of finish applied/colour consistency; • test circuit operation on simulator.	**[2x2]**

7. Systems and controls		
Question Number	**Answer**	**Marks**
(d)	**Explain <u>two</u> benefits to the manufacturer of using standardised components in the production of a washing machine.** **Two** benefits clearly described. • Quality assured components; • choice of suppliers; • no need for additional manufacturing cells; • speed of production.	**[2x2]**
(e)(i)	**Explain why the washing machine water heater must be part of a closed-loop system with feedback.** • The washing machine works at set temperatures for particular clothes/loads. The washing must be able to be set to a known temperature by the consumer and the water heater must maintain this temperature; • the control circuit needs to react to water reaching the set temperature. Feedback from the temperature sensing will ensure this and allow the control circuit to switch off the heater; • if the information regarding the temperature was not fed back, was not part of a closed-loop, the water heater would continue to heat up the water without control of its temperature.	**[4]**
(e)(ii)	**Name a suitable component to measure the water temperature.** Any one: • Thermistor, • temperature sensing ic, • thermocouple.	**[1]**

7. Systems and controls

Question Number	Answer	Marks
(e)(iii)	**Using the minimum number of 2-input NAND gates, design a logic circuit which will send a positive signal to the control circuit and so allow the washing machine to start if:** • **The door is closed;** • **the water is turned on;** • **the start button is pressed.**  each pair of NAND gates (AND) interconnections. correct operation.	**[2]** **[1]** **[1]**
(e)(iv)	**Produce a truth table for the circuit you have designed.**	

S	W	D	Z
0	0	0	0
0	0	1	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

for correct column Z. **[1]**
for correct 3x7 combinations. **[1]**
for same as circuit in **[1]**

7. Systems and controls		
Question Number	**Answer**	**Marks**
(f)	**Discuss the issues that determine the commercial success of an automated product.** • Effective marketing; • value for money; • celebrity usage/radio and TV coverage; • quality of design and manufacture; • appeal/relevance of functions; • endorsements; • any similar correct response. P relevant points relating to the question. 1 mark per point max 3. Q quality of explanation of points. 1 mark per point max 3. S suitable use of examples/supporting evidence. 1 mark per point max 2.	**[8]**
	Question 7 Total	**[36]**

Component 1		
8. Textiles		
Question Number	**Answer**	**Marks**
(a)	**Fig.12 shows a baseball cap.** **Give <u>four</u> justified design requirements for the baseball cap.** **Four** justified design requirements. • The baseball cap must be durable to withstand the wear and tear being put on and taken off regularly and carried around in a bag; • all parts, such as the button and the eyelets must be securely fixed to ensure a quality product; • the baseball cap may need a special finish such as waterproofing or stain resistance if it is to be worn outdoors; • the colour of the baseball cap could relate to fashion/team or club uniform/be light in colour to reflect heat and keep the wearer cool/be a dark colour to avoid stains and dirt; • the baseball cap must be comfortable to wear, the finish inside must be smooth so the baseball cap does not irritate the head; • it must not be too hot to wear – eyelets to let heat and perspiration to escape or use of a breathable fabric; • it needs to be adjustable in size to fit a range of users; • it needs to have a suitable sized peak – large enough to give shade to the eyes but not too large to look odd or be in the way; • a logo could be used to add interest/show brand name/club etc. make it appealing to consumers.	**[4x1]**
(b)	**Describe <u>two</u> examples of how modelling can be used in the design of a baseball cap.** **Two** examples clearly described. • Ideas for the baseball cap can be modelled using CAD to explore a range of colours and textures of fabric. Colourways can be produced quickly and easily; • logo and motif ideas can be tested and tried in different positions on the cap; • 3D scale models can be used to check the overall proportions of the baseball cap and see what it looks like when being worn from all angles; • 2D models can be used to establish an appropriate shape and size for the peak of the baseball cap.	**[2x2]**

8. Textiles		
Question Number	**Answer**	**Marks**
(c)	**Describe <u>two</u> quality control checks that may be carried out during the <u>manufacture</u> of the baseball cap shown in Fig.12.** **Two** checks clearly described. • Check the fabric for faults and colour consistency before cutting; • dimensional check on pattern pieces when the fabric has been cut; • correct and secure assembly of parts e.g., button and eyelets secure; • visual check on the quality of finish shape of baseball cap and peak, position of logo and button; • check on machine stitching – the formation of the stitch; • check accuracy of the stitching – correct seam allowance and top stitching in correct place; • check finished size of baseball cap is within tolerance.	**[2x2]**
(d)	**Explain <u>two</u> benefits to the manufacturer of using standardised components in the production of the baseball cap.** **Two** benefits clearly described. • Quality assured components; • choice of suppliers; • no need for additional manufacturing cells; • speed of production; • reduces cost.	**[2x2]**
(e)(i) **(e)(ii)**	**State a suitable fibre or fabric for the baseball cap.** **Give <u>two</u> properties or characteristics that make the material suitable for this use.** • Polyester cotton – hard wearing, lightweight, washable, slightly water and stain resistant, not damaged by sunlight, relatively comfortable due to the cotton content which makes it absorbent and non-irritating; • Cotton – comfortable to wear as a natural fabric, absorbent, washable, hardwearing, easy to dye, lightweight; • gortex or sympatex or other breathable fabric – waterproof and breathable, comfortable to wear, washable, lightweight; • linen – comfortable to wear as a natural fabric, absorbent, washable, hardwearing, easy to dye, lightweight; • polyamide (nylon) – hard wearing, washable, slightly water and stain resistant, not damaged by sunlight, lightweight; • polyester – hard wearing, washable, slightly water and stain resistant, not damaged by sunlight, lightweight; • a woven construction needs to be used, not knitted.	**[1]** **[2x1]**

8. Textiles		
Question Number	**Answer**	**Marks**
(e)(iii)	**Describe the order of manufacture of the baseball cap.** **Use annotated sketches to support your answer.** **Include details of the pattern pieces used.** • Pattern pieces should show symbols such as the straight grain arrow, number of pieces to cut, seam allowance, notches for matching. The opening at the back should be shown as should pieces to make the peak; • pin the pattern pieces to the fabric, or in industry they may be cut using CAM, a band saw, laser cutter or water jet; • notches and other symbols may be transferred using a hot notch marker or drill; • the order of assembly of the baseball cap can vary; • the two back pieces will need to be stitched together before the bias binding can be attached. The 'adjustable' section will be added then too; • the peak will be made, some form of stiffening will be inserted. Top stitching may be worked before it is attached; • if a logo is to be added, the pieces it sits on may be stitched together, the logo worked and then the crown of the baseball cap assembled, or the baseball cap may be completed before the logo is worked; • the button on the top will be attached last; • the eyelets may be inserted before the crown sections are assembled, or when the baseball cap is complete. Stages identified. max 6. Quality of description and communication. max 3.	**[9]**

8. Textiles		
Question Number	**Answer**	**Marks**
(f)	**Discuss the implications of using smart and modern materials in textile products.** • Cost of materials and any special equipment needed; • fashion appeal/novelty value to improve sales; • improved performance characteristics incorporated into products, e.g. Nomex, Kevlar, Gortex; • specific examples of smart and modern materials, e.g. thermochromic and photochromic pigments; • micro-encapsulation – for well being and to promote healing, personal protective equipment; • interactive textiles, wearable electronics – fibre optic threads and sensors woven in to fabrics; • use of modern materials in medicine; • interactive textiles, computational operations, conducting electricity, collecting and storing energy; • the use of materials in clothing, domestic, agricultural, industrial and transport systems; • quality of design and manufacture. P relevant points relating to the question. 1 mark per point max 3. Q quality of explanation of points. 1 mark per point max 3. S suitable use of examples/supporting evidence. 1 mark per point max 2.	**[8]**
	Question 8 Total	**[36]**

Assessment Objectives Grid (includes QWC)

Component 1

Question 1	AO1	AO2	Total
(a)(i)	1		**1**
(a)(ii)	1		**1**
(a)(iii)	1		**1**
(a)(iv)	1		**1**
(b)(i)	2		**2**
(b)(ii)	2		**2**
(c)(i)		2	**2**
(c)(ii)		2	**2**
(d)(i)	1	1	**2**
(d)(ii)	1	1	**2**
(e)(i)	1		**1**
(e)(ii)	2		**2**
(f)	4	5	**9**
(g)	3	5	**8**
Totals	**20**	**16**	**36**

Question 2	AO1	AO2	Total
(a)(i)	1		**1**
(a)(ii)	1		**1**
(a)(iii)	1		**1**
(a)(iv)	1		**1**
(b)(i)	2		**2**
(b)(ii)	2		**2**
(c)(i)		2	**2**
(c)(ii)		2	**2**
(d)(i)	1	1	**2**
(d)(ii)	1	1	**2**
(e)(i)	1		**1**
(e)(ii)	2		**2**
(f)		9	**9**
(g)	6	2	**8**
Totals	**19**	**17**	**36**

Question 3	AO1	AO2	Total
(a)(i)	1		**1**
(a)(ii)	1		**1**
(a)(iii)	1		**1**
(a)(iv)	1		**1**
(b)(i)	2		**2**
(b)(ii)	2		**2**
(c)(i)		2	**2**
(c)(ii)		2	**2**
(d)(i)	1	1	**2**
(d)(ii)	1	1	**2**
(e)(i)	1		**1**
(e)(ii)	2		**2**
(f)		9	**9**
(g)	6	2	**8**
Totals	**19**	**17**	**36**

Question 4	AO1	AO2	Total
(a)(i)	1		**1**
(a)(ii)	1		**1**
(a)(iii)	1		**1**
(a)(iv)	1		**1**
(b)(i)	2		**2**
(b)(ii)	2		**2**
(c)(i)		2	**2**
(c)(ii)		2	**2**
(d)(i)	1	1	**2**
(d)(ii)	1	1	**1**
(e)(i)	1		**1**
(e)(ii)	2		**2**
(f)		9	**9**
(g)	6	2	**8**
Totals	**19**	**17**	**36**

Question 5	AO1	AO2	Total
(a)(i)	1		**1**
(a)(ii)	1		**1**
(a)(iii)	1		**1**
(a)(iv)	1		**1**
(b)(i)	2		**2**
(b)(ii)	2		**2**
(c)(i)		2	**2**
(c)(ii)		2	**2**
(d)(i)	1	1	**2**
(d)(ii)	1	1	**2**
(e)		12	**12**
(f)	6	2	**8**
Totals	**16**	**20**	**36**

Question 6	AO1	AO2	Total
(a)(i)	1		**1**
(a)(ii)	1		**1**
(a)(iii)	1		**1**
(a)(iv)	1		**1**
(b)(i)	2		**2**
(b)(ii)	2		**2**
(c)(i)		2	**2**
(c)(ii)		2	**2**
(d)(i)	1	1	**2**
(d)(ii)	1	1	**2**
(e)(i)	1		**1**
(e)(ii)	2		**2**
(e)(iii)		9	**9**
(f)	6	2	**8**
Totals	**19**	**17**	**36**

Question 7	AO1	AO2	Total
(a)(i)	1		**1**
(a)(ii)	1		**1**
(a)(iii)	1		**1**
(a)(iv)	1		**1**
(b)(i)	2		**2**
(b)(ii)	2		**2**
(c)(i)		2	**2**
(c)(ii)		2	**2**
(d)(i)		2	**2**
(d)(ii)		2	**2**
(e)(i)	2	2	**4**
(e)(ii)		1	**1**
(e)(iii)	2	2	**4**
(e)(iv)	3		**3**
(f)	4	4	**8**
Totals	19	17	**36**

Question 8	AO1	AO2	Total
(a)(i)	1		**1**
(a)(ii)	1		**1**
(a)(iii)	1		**1**
(a)(iv)	1		**1**
(b)(i)	2		**2**
(b)(ii)	2		**2**
(c)(i)		2	**2**
(c)(ii)		2	**2**
(d)(i)	1	1	**2**
(d)(ii)	1	1	**2**
(e)(i)	1		**1**
(e)(ii)	2		**2**
(e)(iii)		9	**9**
(f)	6	2	**8**
Totals	19	17	**36**

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced GCE

DESIGN AND TECHNOLOGY F524

Unit 4: Product Design; Component 2

Specimen Mark Scheme

The maximum mark for this paper is [54].

Component 2			
	Specification points (SP) A3 sheet 1 of 4		**Marks**
SP	**3 Specification points which are qualified and justified 2 marks each** A clear relevant statement – **1 mark** A clear relevant justification – **1 mark** A relevant unjustified point that simply repeats information stated in the stem – **1 mark** A generic non-specific statement – **0 marks**	**3x2**	**6**
	Ideas with Development (ID) A3 sheets 2 and 3 of 4		
R	**Range of developed ideas** **0–5** A limited range of ideas with little evidence of innovation and little development. **6–10** A good range of appropriate innovative ideas with limited development of some or all ideas. **11–15** A wide range of significantly different innovative ideas which are each developed as far as possible.		**15**
C	**Consideration of appropriate manufacturing/construction techniques** **0–2** Limited consideration of appropriate techniques. **3–4** Some consideration of appropriate techniques. **5–6** Detailed consideration of appropriate techniques.		**6**
M	**Justification of appropriate materials and components** **0–1** Limited justification of appropriate materials and components. **2** Some justification of appropriate materials and components. **3** Detailed justification of appropriate materials and components.		**3**
D	**Consideration of appropriate measurements** **0–1** Limited consideration of measurements. **2** Some consideration of measurements. **3** Detailed consideration of measurements.		**3**
E	**Evaluation of ideas with reference to the specification and volume production** **0–2** Limited evidence of evaluation. **3–4** Some evidence of subjective evaluation. **5–6** Detailed evidence of objective evaluation.		**6**

	Final Developed Outcome (FDO) A3 sheet 4 of 4		**Marks**
F	**Chosen features for FDO** **0–2** Limited features identified. **3–4** Some features identified. **5–6** Detailed description of features identified.		**6**
J	**Justification of choices made with reference to specification** **0–1** Limited justification of choices made. **2** Some justification of choices made. **3** Detailed justification of choices made.		**3**
	Efficient Communication (EC) A3 sheets 1–4		
EC	**Communication skills and techniques** **0–2** Limited level of graphical skill and annotation. **3-4** Reasonable level of graphical skill and annotation appropriately used. **5-6** High level of graphical skill and annotation that can be easily followed by a third party.		**6**
		Paper Total	**[54]**

Assessment Objectives Grid (includes QWC)

Component 2

	AO1	AO2	Total
Built Environment and Construction	27	27	**54**
Engineering	27	27	**54**
Food	27	27	**54**
Graphic Products	27	27	**54**
Manufacturing	27	27	**54**
Resistant Materials	27	27	**54**
Textiles	27	27	**54**
Systems and Controls	27	27	**54**

	AO1	AO2
SP	**6**	
R	**15**	
C		**6**
M		**3**
D	**3**	
E	**3**	**3**
F		**6**
J		**3**
EC		**6**
Total	**27**	**27**