

Assessment Objectives for the Written Paper

Assessment Objectives

AO3: Analyse and **evaluate** – wider issues in design and technology

(20% overall – 10% of which is assessed through the written paper)

AO4: Demonstrate and **apply** knowledge and understanding of:

- technical principles
- designing and making principles

(40% overall – all of which is assessed through the written paper)

Structure of the written paper

It's a 2-hour paper 50% of total marks

There are three sections:

- **Section A** (20 marks) consists of multiple choice and short answer questions examining core technical principles
- **Section B** (30 marks) consists of longer response questions that assess the specialist technical principles
- **Section C** (50 marks) consists of questions that assess the designing and making principles.

Content and skills for the written paper – Section A

Core technical principles

- New and emerging technologies
- Evaluation
- How energy is generated and stored
- Modern and smart materials
- Understanding a systems approach when designing
- Mechanical devices
- Materials and their working properties

Example Section A questions

A designer has created a security system for use in a home. The system is intended to alert the home owner to an intruder. What is the input in this system?

- A** Alarm sound
- B** Automatic message sent to mobile phone
- C** Flashing light
- D** Motion sensor

[1 mark]

Which **one** of the following is a softwood?

- A** Beech
- B** Mahogany
- C** Oak
- D** Spruce

[1 mark]

State **two** reasons why corrugated cardboard is used as packaging for cooked pizzas.

[2 marks]

1. _____

2. _____

The amount of renewable energy generated in 2015 was 83.3 Terawatt hours (TWh).

The ratio of solar power to other forms of renewable energy was 1:10.

What amount of energy was attributed to solar power?

Give your answer to 1 decimal point.

[2 marks]

Content and skills for the written paper – Section B

Specialist technical principles

- Selection of materials or components
- Forces and stresses on materials
- Ecological and social footprint
- Scales of production
- Sources and origins
- Physical and working properties
- Stock forms, types and sizes
- Specialist techniques (including quality control)
- Surface treatments and finishes

Example Section B questions

16 . 1

Choose **one** product or component in **Figure 2** and describe **two** features that make it suitable for mass production.

[2 x 2 marks]



Figure 2

Designers sometimes choose materials according to their impact on society and the environment.

Examples include the use of fair trade cotton, recycled components and biodegradable packaging.

Evaluate how the use of such materials might be seen as the ethical choice.

[10 marks]

Circle **one** of the following and give **two** reasons why its characteristics or physical properties are suitable for its intended use.

- **Polypropylene** – for a school stacking chair
- **Foam core board** – for a display board
- **Brass** – for a trumpet
- **Pine** – for a bedroom wardrobe
- **Silk** – for use in a men's tie
- **Printed Circuit Board (PCB)** – for use in a hand held game

[2 marks]

Name **one** industrial process used in the manufacture of the product or component you have chosen for question **16.1**.

In the box below, use notes **and/or** sketches to explain this process in detail.

trial process:

[5 marks]

Content and skills for the written paper – Section C

Designing and making principles

- Contexts
- Primary and secondary data
- Needs and wants
- Investigation
- Environmental, social and economic challenges
- Idea development
- The work of others
- Design strategies
- Communication of design ideas
- Prototype development
- Selection
- Marking out
- Tolerances
- Waste
- Tools and equipment
- Techniques and processes
- Finishes

Example Section C questions

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SECTION C - Designing and Making Principles

The product below is a GPS Sports Watch worn by adult runners to monitor activity and aid training.



Specification

- Lightweight
- Waterproof (face and strap)
- Rechargeable battery
- Battery lasts up to 3 weeks (10 hours in GPS mode)
- Watch features include; time, date, calendar, alarm, touchscreen and GPS for recording sporting data.

Evaluate the watch in terms of its:

- I. Suitability for the user [4 marks]
- II. Aesthetic quality [4 marks]
- III. Ergonomics [4 marks]
- IV. Explain what is meant by the term 'anthropometrics' and why it is important for designers to consider. [4 marks]
- V. Name two anthropometric measures that might be used in the design of a watch. Explain why each is appropriate. [2 x 2 marks]
- VI. Study the image and specification of the watch on page 19. You have been asked to redesign the watch for a child aged between 9 and 11 years old. In order to make the watch more appealing to children it should allow for activities other than running. Give four changes or additions to the original design specification and explain how each would make the watch suitable for the new target market. You should not refer to the colour of the watch in your answer.

Marking criteria

Only AO3 and AO4 are examined on the paper	
Analyse and evaluate	20 marks
Demonstrate and apply knowledge and understanding	80 marks
Application of mathematics	15 marks from above
Total	100 marks

Understanding Key words in exam questions

Analyse

Separate information into components and identify their characteristics

Apply

Put into effect in a recognised way

Assess

Make an informed judgement

Calculate

Work out the value of something

Compare

Identify similarities and differences

Discuss

Present key points about different ideas or strengths and weaknesses of an idea

Evaluate

Judge from available evidence

Examine

Investigate closely

Give

Produce an answer from recall

Identify

Name or otherwise characterise

Justify

Support a case with evidence

Name

Give the correct title or term

Outline

Set out main characteristics

State

Express clearly and briefly

Suggest

Present a possible case/solution

Summarise

Present principle points without detail

Illustrate

Present clarifying examples

SUBJECT SPECIFIC VOCABULARY

Automation
The use of control systems for operating equipment such as machinery and processes in factories; this reduces human input.

Client
The person/people/audience being designed for and whose needs are being met.

Commercial process
Manufacturing method used to produce products in quantity.

Commercial product
A product intended to make money.

Conceptual stages (of design)
Use of models, sketches and computer aided design (CAD) to show the design of a product as it develops.

Continuous improvement
The identification of improvements and subsequent evolution of products.

Co-operative
A group of people united to meet common social, economic or cultural need through a jointly-owned business.

Crowd funding
A large number of people who raise money for a project or venture.

Ecological
The consideration of the environment and the impact that design can have on it.

Ethics
Moral decisions when designing and manufacturing.

Fabricate
Using processes such as cutting, bending, joining and assembly to produce products.

Finite
A material or source which will one day run out.

Functionality
How well a product carries out its purpose.

Fusibility
How well a material is converted by heat into a molten or liquid state dependent on its melting point.

Iterative design
Design methodology based on a cyclical process of analysing, prototyping and testing to refine a product. Each iteration and result starts the process again.

Lean manufacturing
Reducing and eliminating waste in a manufacturing process.

Life cycle assessment
A technique used to assess the environmental impact of a product at all stages of its manufacture, use and disposal.

Market pull
Products developed to meet the needs of society or a specific section of the market.

Mechanical device
Mechanism which produces and/or changes movement.

Nesting
The tessellation of shapes or nets on a material to minimise the amount of waste during manufacture.

Physical properties
Properties that refer to the actual matter that forms the material (eg insulation, conductivity, fusibility).

Planned obsolescence
Deliberately designing the lifecycle of a product to be short, forcing the user to update their products quickly.

Primary source
Research collected first-hand by a designer to develop a product or idea.

Primary source (of materials)
Where materials originate (polymers from oil etc) and the raw material that needs to be converted into a workable form.

Product
Item or artefact developed for an intended audience to solve a problem or meet a need.

Prototype
An early model or sample of a product used to test a concept.

Schematic diagram
Graphic symbols or simplistic diagrams used to convey a system (eg an underground map).

Social footprint
The impact a product or individual has on society.

Social responsibility
The idea that a designer needs to evaluate the impact their product could have on society and take action to make this better.

Stock form
The standard shape and size of materials as they are bought.

Technology push
Technological discoveries used to drive the development of a product.

Tolerance
The minimum and maximum measurements that can be accepted when manufacturing.

User
The person/people who make use of the product that has been developed by a designer.

User centered design
Design development with the user at the centre of the focus. The designer tries to envisage how the product will actually be used, as opposed to focusing on other areas such as cost.

Working properties
How a material reacts to external forces